March 16, 1942

STEEL

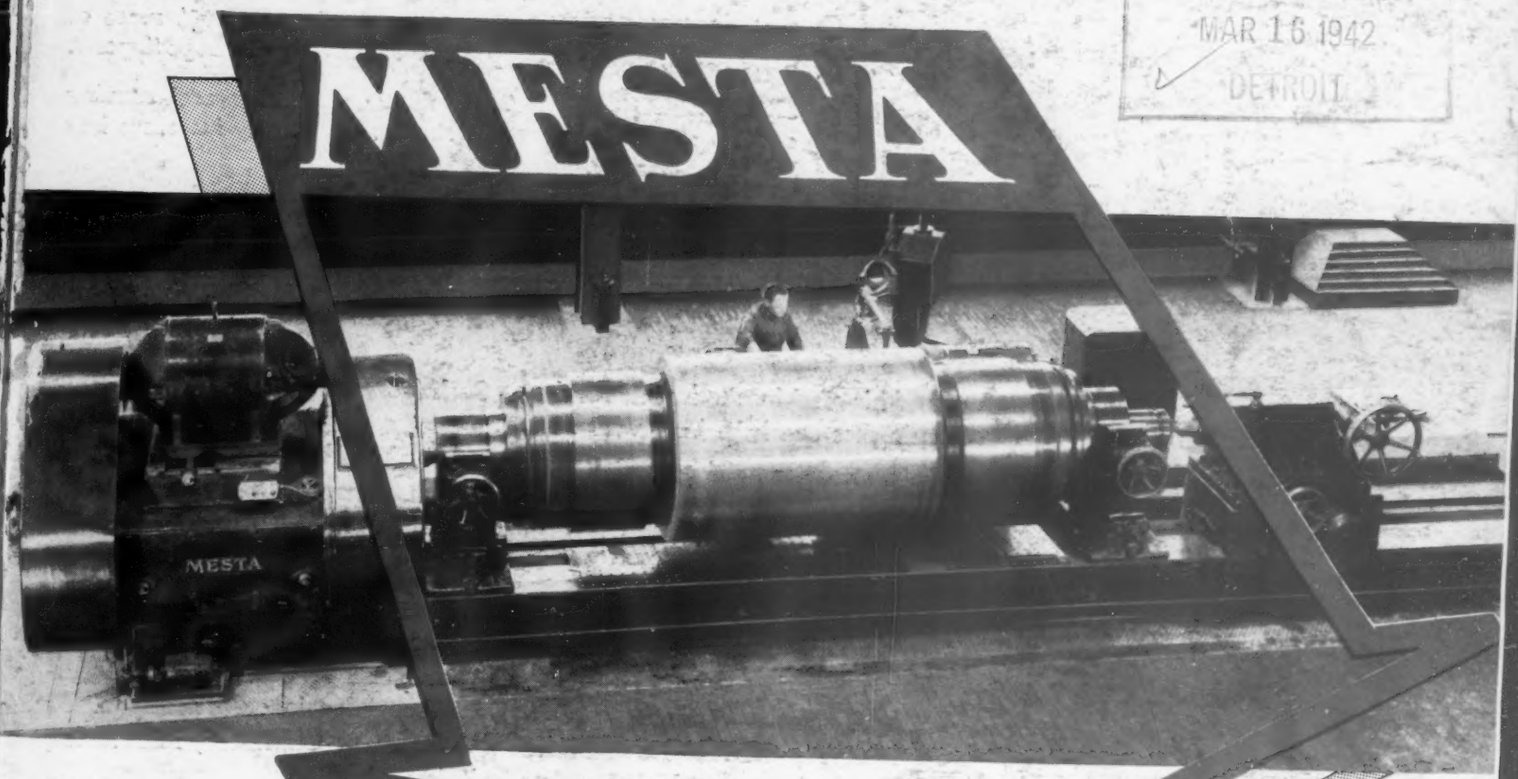
PRODUCTION • PROCESSING • DISTRIBUTION • USE

ESTABLISHED 1882

CHNOLOGY DEPT.

PUBLIC LIBRARY
MAR 16 1942
DETROIT

MESTA



MESTA was among the first to be awarded the FLAG of the UNITED STATES BUREAU OF ORDNANCE and NAVY "E" PENNANT.

HEAT TREATED
SPECIAL ALLOY STEEL
BACKING-UP
ROLLS
For Four High
HOT AND COLD MILLS

IESTA MACHINE COMPANY
ITTSBURGH, PA. U.S.A.

4 WAYS BETTER...

TEXROPE* SUPER-7

1 **50% STRONGER CORDS!** Sensational new Flexon process makes cords 50% stronger than even those in former great Texrope belts.

2 **20% MORE CORDS!** Count them! You get 20% more of these tough, extra pulling power cords in every Texrope Super-7.

3 **INCREASED LIFE!** Cords float on amazing cool-running cushion rubber that absorbs shock . . . actually increases belt life phenomenally.

4 **EXTRA PROTECTION!** Exclusive duplex-sealed cover protects pulling cords against dirt, grit, moisture, and other adverse elements.

SINCE Texrope V-belts revolutionized power transmission sixteen years ago, they have steadily been "tops" among belt users. But here's the NEW Texrope Super-7 V-belt that's even better — 4 WAYS BETTER!

To the war-busy manufacturer who must get maximum efficiency out of his machines today, this is the V-belt that can help him, with . . .

50% stronger pulling cords!

20% more cords!

Duplex-sealed cover for extra protection against dirt, moisture!

Cool-running cushion rubber section for increased life!

What's more — these are in *addition* to the regular features that have long made Texrope V-belts first choice with plant men everywhere.

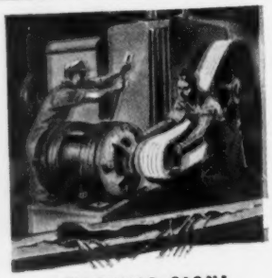
Such features as — true V-shape for greatest groove-grip action . . . matched "sets" of belts that pull together... smooth, slipless, silent operation . . . backed by Allis-Chalmers engineering cooperation that assures you get the *right* belts for *your* job.

For complete information, call your Texrope dealer, or the Allis-Chalmers district office near you. Or write Allis-Chalmers, Milwaukee, Wisconsin.

A 1475

LOOK OUT FOR DANGER

in belts with stiff, unpliable cords! Such belts *look* strong . . . but actually they buckle over sheaves, build up excessive heat that attacks pulling cords. Result: Belt failure far sooner than you expect it.

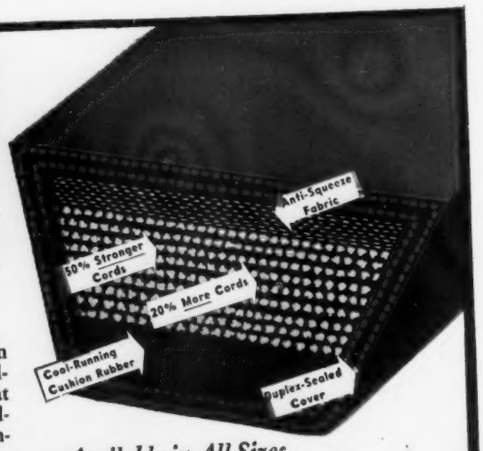


WARNING SIGN!

Sagging, slipping belts mean too much stretch not backed up by balanced cord strength. Motor must be pulled back often to take up slack. Result: When stretch limit is reached belt breaks under tension.

SUPER-7 TEXROPE BELTS

are made by amazing Flexon process that *combines* flexibility with low stretch . . . great strength. Cords float on cool-running, shock absorbing cushion rubber. Result: *true* strength . . . *true* pulling power . . . *true* endurance.



Available in All Sizes
½ hp to 2000 hp

*Trade mark registered U. S. Patent Office. Texrope Super-7 Belts are the result of the cooperative research and design genius of *two* great companies — Allis-Chalmers and B. F. Goodrich — and are sold exclusively by Allis-Chalmers.

ALLIS-CHALMERS

MILWAUKEE-WISCONSIN

In America's ROLLING FORTRESSES

An essential part of America's program for victory are the U. S. Army tanks now rolling from assembly lines in a dozen and more great plants. Bethlehem Carbon Bars and Special Sections are currently being used in large tonnages in the manufacture of these rolling fortresses.

Carbon bars for washers, hinge pins, dowel pins and rivets in protected locations; bars for drop-forgings; free-machining steel for threaded parts—these are typical of the many applications in which these Bethlehem Steel products are helping to keep America's fortresses rolling.

Bethlehem Carbon Bars

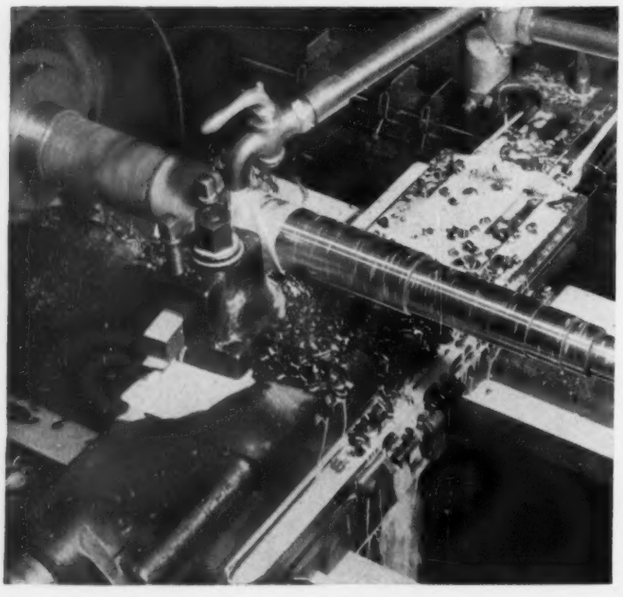
BETHLEHEM STEEL

BETHLEHEM STEEL COMPANY

Save man-hours and machine-hours

From the forgings pictured above, the two spindles shown are rough and finish turned automatically on a 20″ Monarch Model M Lathe, equipped with Automatic Sizing.

The combination of quick setup, automatic turning of multiple diameters and automatic return of carriage to starting point enables one operator to handle two or more machines, without excessive effort and with quality production maintained. Low setup time permits small or large lot runs with automatic lathe production. Important also is the assurance of more perfect duplication than is practical with manual control.



How this job is done

1 Support work between centers.

2 Setup—set gauge blocks or template and set tool.

3 Turn multiple diameters.

4 Remove work from lathe.

Material—SAE-2350 steel forging. Tools—cemented carbide. Setup time—12 minutes. Cutting time—12 minutes per spindle.

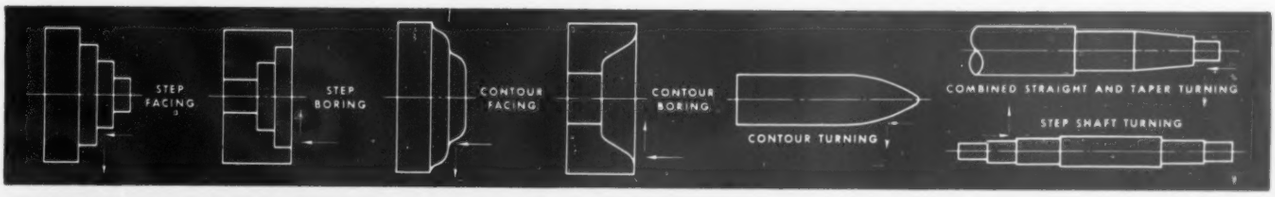
with Monarch AUTOMATIC SIZING

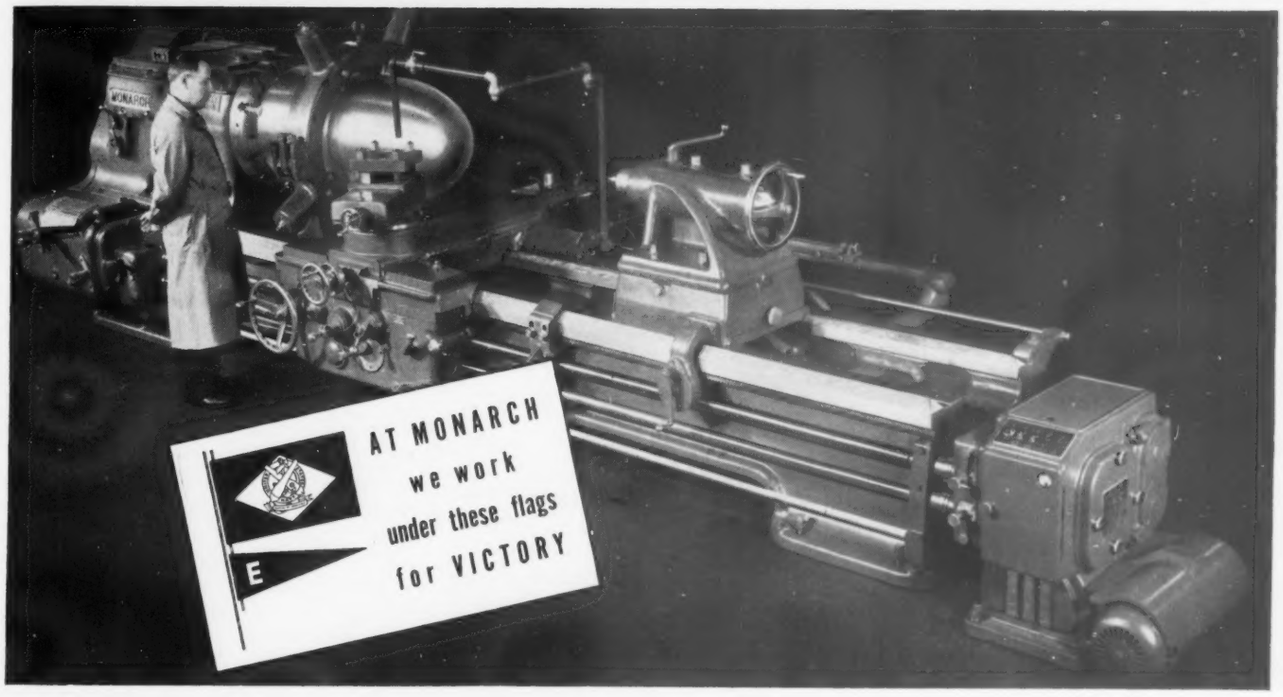
The diagrams on this page illustrate a few of the many varieties of work that can be done *automatically* and accurately with Monarch Automatic Sizing. It can be applied to Monarch standard or toolmakers' lathes. Lathes so equipped can be operated either automatically or manually, the change being simple, requiring a matter of seconds.

Today Monarch Lathes with Automatic Sizing are at work saving man-hours and machine-hours for VICTORY. The Monarch Machine Tool Company, Sidney, O.

MONARCH LATHES

COVER THE TURNING FIELD





Behind the Scenes with STEEL

Euphemisms

■ These *are* busy times, we know, and as the Bell Telephone Systems have been explaining very carefully in their advertising lately .we can all help alleviate the load by using the phone as sparingly as possible. But we should like to be so bold as to suggest that the real trouble lies with the "little men who aren't there" whenever we do call them.

For example, a New York secretary collected the following excuses from switchboard operators the other day in the course of an average morning:

Not at his desk.
Just stepped out.
Somewhere in the building.
Talking on another telephone, will call right back.
Has someone with him and can't be disturbed (as a variation from the usual In Conference).
In the plant.
Just left the office.
Gone uptown.

And then one honest central girl, who admitted Mr. Jones had gone across the street for a cup of coffee and would telephone back in ten minutes.

War-Time Advertising

■ If you have not yet obtained and carefully read a copy of the Associated Business Papers' new "Guide To Effective War-Time Advertising", we suggest you write for a copy at once.

Here, in a nutshell, is the key to what many advertisers are making a difficult problem. It explains, with plenty of examples, that when an advertiser understands how each business paper editor goes about building a vital reader usefulness into his particular publication, he understands that business paper advertising, too, is simply a means of transmitting information from where it is to where it is needed.

ABP's address is 369 Lexington Ave., New York. Get your copy today.

Good Example

■ Our hats are off to the American Nickeloid spread this week with the headline: *Let's Put Our Headaches Together!*

Correction, Please

■ Ordinarily the proof room does a swell job of correcting our atrocious errors in spelling but last week their good intentions carried us into the vale of embarrassment. We therefore hasten to apologize to Henri, Hurst & McDonald Inc., good advertising agency for Fairbanks, Morse and others, for the glaring "y" we had in Henri.

And we now have the pleasure of adding Walker & Downing, Pittsburgh, to our list of agencies conserving paper by foregoing proofs when complete plates or electrotypes are furnished for such good advertisers of theirs as Allegheny-Ludlum, Swindell-Dressler, Vaughn Machinery, etc.

Politics In Steel

■ And speaking of proof room errors, we feel in rather august company after reading about the *Republican* Steel Corporation in the *New York Times* the other day.

This War World

■ Latest developments on the Priorities, Allocations and Prices front include:

An A-1-J is now necessary to obtain either goose or duck feathers.

In a reorganization of OPA a new division of Food & Apparel was recently set up, under which comes such incongruous subdivisions as Fertilizer, Leather Footwear, and Agricultural Machinery.

An advisory committee has been appointed on brassieres and foundation garments.

A new order just released covers Osnaburgs, which as you know perfectly well is a coarse linen.

Beginning March 30 new suits will *not* have: Vests (except single-breasted), long coats, patch pockets, fancy backs, wide trousers, pleated trousers, wool belts, cuffs.

Saving Paper

■ And incidentally the paper shortage may have been somewhat affected by the nine-page invitations to bid on the moving of Army Chaplain Wm. B. Stimson from Philadelphia down to South Carolina. Of course, this was the government's short form contract, which we presume is a real saving after all.

Thank You

■ This week's choice orchid comes from Milan W. Freese, Ohio Seamless Tube Co., Shelby, Ohio, who writes:

We wish to express our very earnest compliments for the work that your magazine is doing to help American industry.

Too Late Now

■ If by the time you pick up this issue and read these words you haven't yet had your little tete-a-tete with the C.O.I.R. (Revenooer to you) you'd better go rent yourself a good secure bomb shelter and lock yourself in from the *inside!*

An Idea

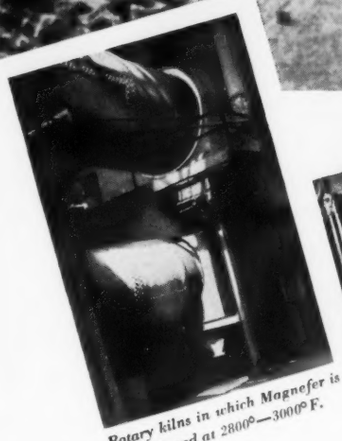
■ Donald Nelson asked us all the same question on the 2nd of March. Why don't you have it shouting from every bulletin board in your plant?

Are you doing everything within your power today to put more weapons into the hands of our fighting men?

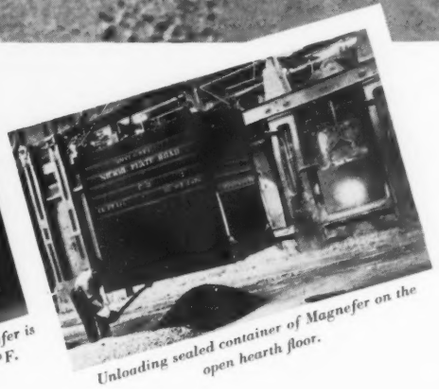
Vol. 110, No. 12, March 16, 1942, issue of STEEL, published every Monday at Cleveland, O. Entered as second class matter at the postoffice, Cleveland, O., under act of March 3, 1879. U. S. and possessions, Canada, Mexico, Cuba, Central and South America, 1 year $6; 2 years $10; all other countries, 1 year $12. Current issues, 25c. Yearbook of Industry issue, $2.00

Buy a Defense Bond—Today!

MORE MAGNEFER FOR MORE STEEL



Rotary kilns in which Magnefer is clinkered at 2800°—3000° F.



Unloading sealed container of Magnefer on the open hearth floor.

● Day and night, the blasting, crushing and burning of dolomite goes on, to make more Magnefer to produce more steel.

New primary crushing equipment that increases our raw dolomite capacity by 50% has been installed. A large reserve stock of crushed rock has been established. Preparation and burning plants, no longer immediately dependent on primary crushing, now operate steadily at maximum rates to turn out more of the refractories that steel must have.

With production of Magnefer and other prepared refractories at the all-time high, laboratory controls of manufacture are strictly maintained; in fact, are being steadily improved. Uniformity of product is closely guarded and desirable properties embodied to make each material do a particular, efficient job in the furnace.

Dependable refractory service by Basic Refractories, Inc., is helping produce more steel and better steel for America's tremendously expanded Victory program.

Basic Refractories for the Steel Industry:

MAGNEFER—Dead-burned dolomite for hearth and slag line maintenance.

SYNDOLAG—Dead-burned dolomite, smaller in grain size than Magnefer.

BASIFRIT—Quick-setting magnesia refractory for new construction, resurfacing and general maintenance.

GUNMIX—A basic refractory with chemical bond, sized for use with a cement gun.

RAMIX—An air-setting basic refractory for rammed hearths and cold furnace repairs.

695 PLASTIC—Strong plastic with basic and neutral properties, for hot and cold repairs.

OHIO MAGNESITE—Domestic dead-burned high-magnesia grain refractory, equal to Austrian.

HEARTH PATCH—For deep hole patching and other quick repairs in the basic open hearth.

HIGH-GRADE PREPARED REFRACTORIES FOR THE CONSTRUCTION, MAINTENANCE AND REPAIR OF BASIC OPEN HEARTH AND BASIC ELECTRIC FURNACE HEARTHS

BASIC REFRACTORIES, INC.

FORMERLY BASIC DOLOMITE, INC. CLEVELAND, OHIO

Our "Know How"

Checking aircraft products with modern hardness testing equipment.

Testing thread accuracy of precision products with the thread comparator.

Magnetic inspection of product intended for highly stressed applications.

CAN MAKE YOUR JOB EASIER IN WAR MATERIAL PRODUCTION

● Is yours one of the plants confronted with strange, new problems of war materials production? Are you faced with intricate "specs" that are new to your methods and equipment? Are you "snowed under" with details that you are unprepared to handle quickly?

If your problems involve bolted assemblies—lean heavily on Lamson & Sessions' "*know how*" to help lighten your burden.

"Know how" anticipates that the most modern methods of manufacture are in use at Lamson & Sessions' *five plants.* In our factories you will find the most modern machinery for bolt manufacture in the world, the most modern equipment for heat treatment, plating, inspection, development and research. Our personnel is expertly trained not only in manufacturing but is unsurpassed in engineering as well. "Know how" here is a tangible help to you if your problem can be solved by bolt specialists. Let us be more specific.

Lamson & Sessions' plants are heading and heat treating aluminum alloys and have facilities for anodic treatment of these alloys.

Spectroscopic inspection is a routine part of Lamson & Sessions' quality control.

Magnetic inspection is another routine part of Lamson production—and we are fully equipped for that.

Hardness testing facilities here are the latest—heat treating equipment the newest and most modern.

Inspection in every department is maintained throughout our plants—and every provision made for maintaining exacting standards of accuracy.

All of these facilities are in constant use here, and have been for a long while. They are part and parcel of our production equipment to fit the times. Our personnel is trained to use these facilities properly. In short, we already have the "know how" which will solve some of your problems quickly and efficiently, *and at no expense to you.*

You, too, can draw upon the accumulated experience of Lamson & Sessions with the same assurance that others do for fulfilling rigid Government specifications—for Lamson personnel has long been accustomed to interpret and comply with Government requirements, and is doing so every day.

It is possible that Lamson & Sessions' "know how" can help you—

Save time—because we may be able to show you how to use a part we can make by hot or cold forging (now made on screw machines) and make it more quickly by our methods.

Save money—because we may be able to show you how to use a part produced by bolt-making machinery, to standard specifications, with a minimum waste of raw materials instead of a "special" milled from the bar.

Save critical alloys—because we may be able to show you how to use a carbon steel bolt properly heat treated that will serve as efficiently as an alloy steel bolt—and thereby conserve critical alloys for other purposes.

Save raw material—because we may be able to show you how to replace a large bolt (not heat treated) by a smaller *heat treated* carbon steel bolt. *Here is a specific example:*

	¾" DIA.	½" DIA.
Actual breaking load	24,000 lbs.	24,000 lbs.
Weight per 100 bolts	82 lbs.	35 lbs.
Ultimate tensile strength	71,700 psi.	150,000 psi.
Material	Hot rolled steel of 0.14 to 0.22 carbon content	S. A. E. 1035 steel
Heat-treatment	Stress relief	Quench and draw
Diameter of bolt	¾ in.	½ in.
No. of threads per in.	10	20
Mean diameter	0.6526 in.	0.4512 in.
Area at mean diameter	0.3344 sq. in.	0.1599 sq. in.
Length under head	6 in.	6 in.

Above data shows essentials of some of the timeliest advice given by Lamson engineers. It shows how and why a smaller bolt using 57% less steel will carry the same load in tension as the larger bolt!

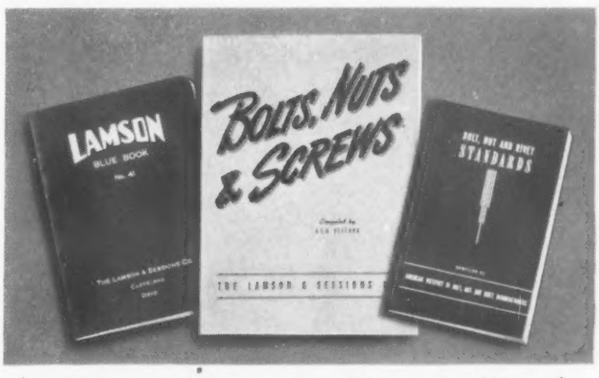
We have shown you how to get better deliveries, better products, faster assemblies or lower costs by the use of hot or cold forged products. When we can do all this *and also show you* how to save steel or avoid the use of critical alloys—that is Lamson "*know how*" at work *again.* Ask a Lamson engineer to call and talk it over with you. He is trained to *help you*—not just to sell you something.

These three books will help you in specifying and buying standard bolts and "specials"

The Lamson Blue Book—our complete catalog of *standard* products excepting our aircraft products.

"**Bolts, Nuts and Screws**"—70 pages of technical and practical information. First copy gratis if requested on your letterhead; additional copies *one dollar each.*

"**Bolt, Nut and Rivet Standards**"—175-page book published by the American Institute of Bolt, Nut & Rivet Manufacturers, 1550 Hanna Bldg., Cleveland, Ohio; Price *one dollar* per copy. (Order from the publishers, please.)



★ ***BUY U. S. DEFENSE BONDS*** ★

A recent excellent article "Cold Header or Screw Machine?" by Herbert Chase, Consulting Engineer, giving detailed engineering data on the subject of this advertisement, will be mailed free on request.

THE LAMSON & SESSIONS COMPANY • 1971 West 85th Street • Cleveland, Ohio

Plants at Cleveland and Kent, Ohio; Chicago and Birmingham

LAMSON & SESSIONS

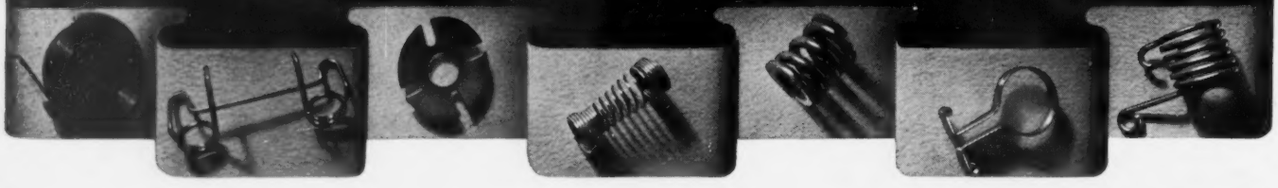
BOLTS · · NUTS · · COTTERS · · CAP SCREWS · · SPECIALS

Your Jobber Stocks the Lamson Line

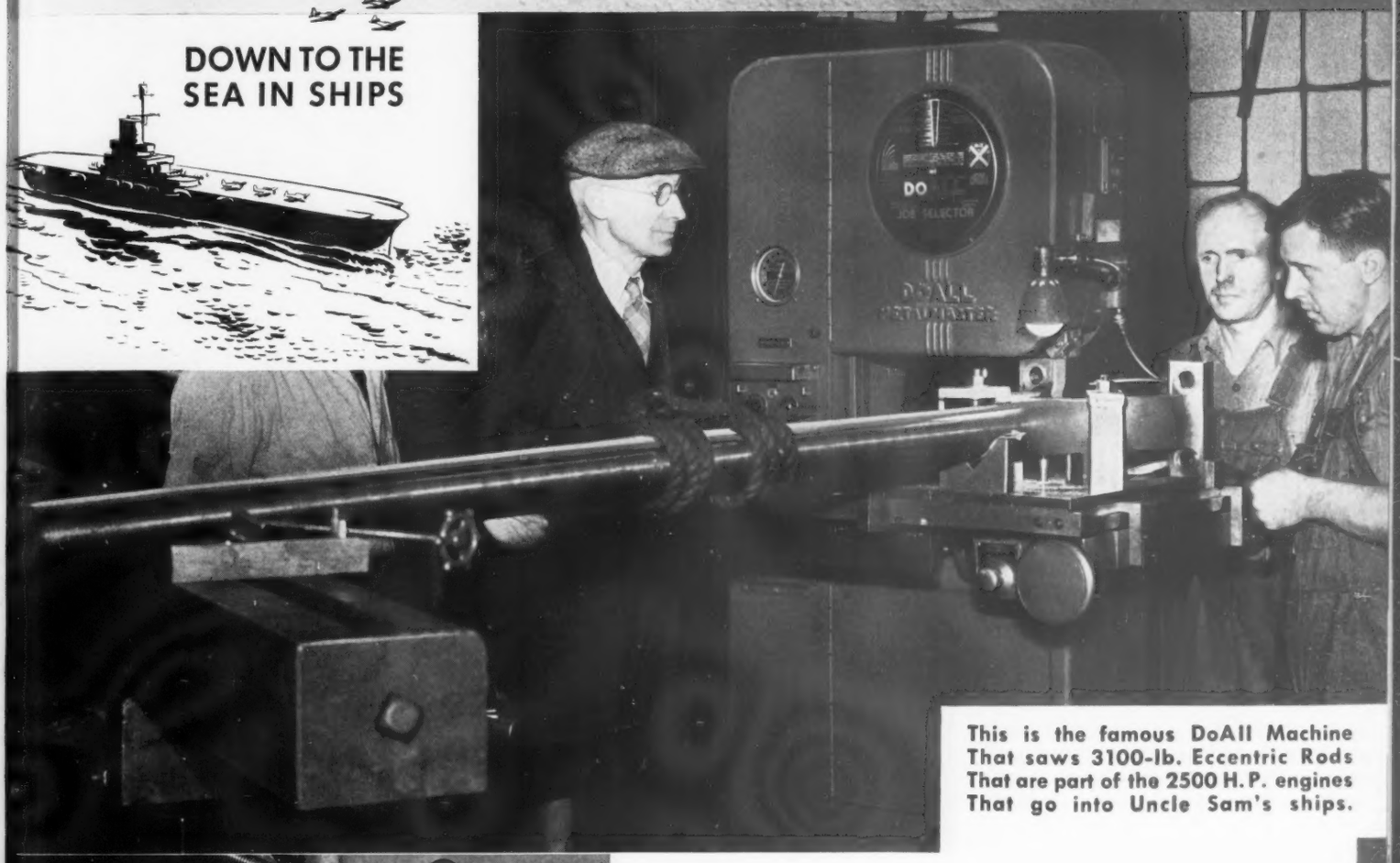
GREASED LIGHTNING! .... that strikes many times in the same place . . . . . aimed by the stamina and courage of youth. Pulling out of a power dive is as tough a test of materials and construction as could be found. Into bombers, fighters and transport planes go Barnes-made springs in endless streams—with a common urge—the urge to "dish it out" as well as "take it."

Wallace Barnes Company
DIVISION OF ASSOCIATED SPRING CORPORATION
BRISTOL, CONNECTICUT, U. S. A.

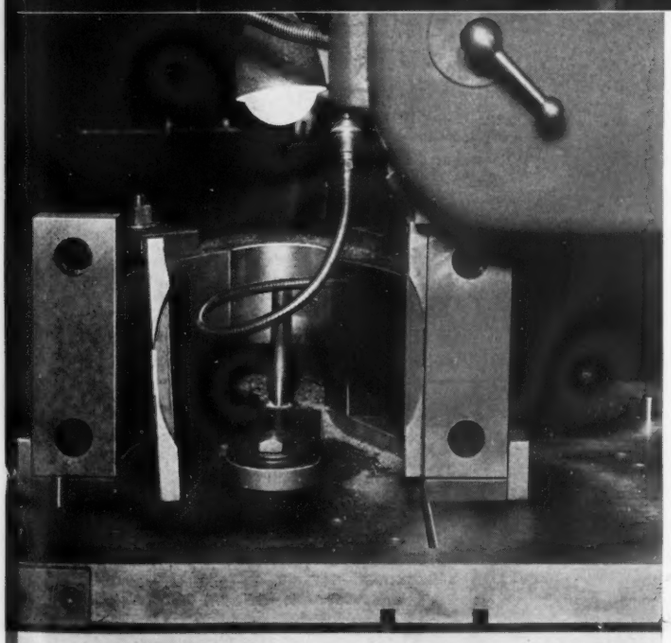
Barnes-made Springs *for Victory*



DoAll SPEEDS PRODUCTION



This is the famous DoAll Machine
That saws 3100-lb. Eccentric Rods
That are part of the 2500 H.P. engines
That go into Uncle Sam's ships.



7 HOURS' WORK IN 1 HOUR

At Filer & Stowell Co., Milwaukee, Wis., this Connecting Rod formerly took 7 hours to machine by boring and slotting. Now DoAll does the same work in 1 hour, and the slotter and boring mill are released for other work.

The DoAll sets new production records. Takes the place of shaper, milling and lathe work on hundreds of operations. Priced from $1,000 to $5,000 complete with necessary equipment. Worth its weight in gold—Investigate the DoAll at once.

Let us send a factory-trained man to your plant with a DoAll to show you what it can do and save for you.

DoAll
Contour Sawing
BAND SAWING
BAND FILING
BAND POLISHING

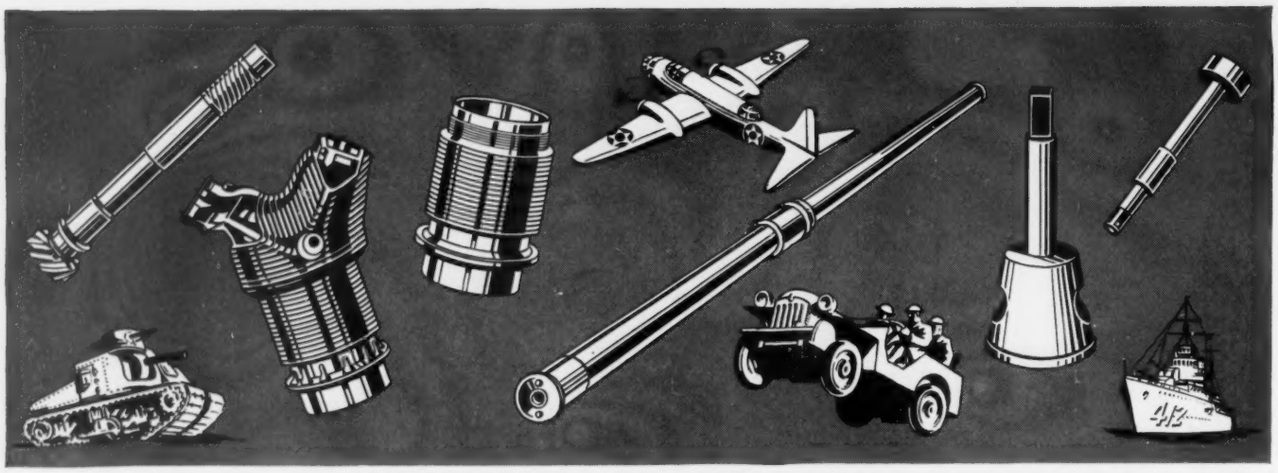
★ Fastest Precision Method of Removing Metal

NEW
Interesting and Valuable book "DoAll on Production" free on request.

CONTINENTAL MACHINES, INC.

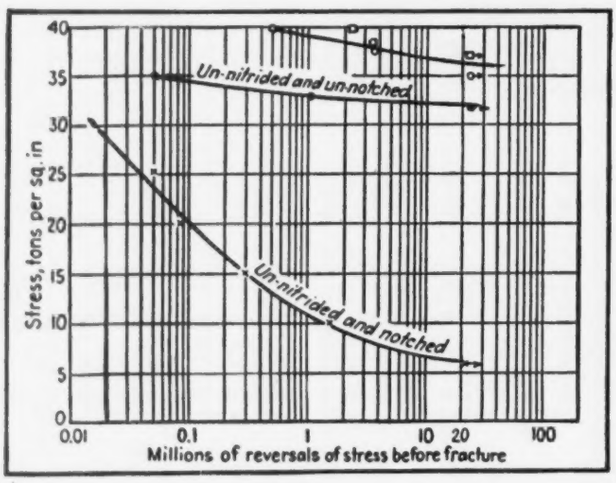
1324 S. Washington Ave., Minneapolis, Minn.

Associated with the DoAll Company, DesPlaines, Ill.,
Manufacturers of Band Saws and Band Files for DoAll Contour Machines.



PRODUCE THEM FAST—BUT MAKE THEM LAST

Speeded production is the order of the day but, unless we build durability into our armament and the machines that make it, we squander our resources. To save the toll of early replacement of steel machinery parts subject to wear and fatigue, make them of NITRALLOY—the Alloy Steel which, when NITRIDED after machining, produces unmatched resistance to fatigue and forms the hardest steel surface known, and with controlled core properties. This hardness remains unaffected by temperatures of 1000° F. for long periods of time. Fatigue resistance is tremendously increased by NITRIDING. For example:



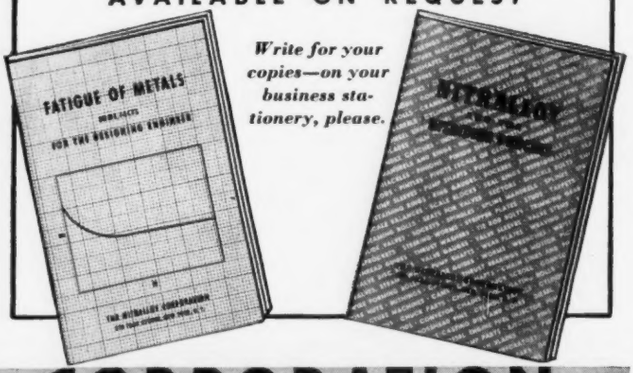
The NITRIDED case is less susceptible to scoring and galling than case-hardened and hardened steels, due to the stability of the case characteristics at high temperatures. NITRALLOY'S excellent resistance to wear has resulted in wide application for cylinder barrels of high-power aircraft motors. Resistance to many corrosive elements further indicates the advantages of NITRIDED NITRALLOY for machinery parts subject to wear and fatigue.

NITRIDING

is the process of case hardening certain alloy steels by means of a nitrogenous medium, such as ammonia gas. The alloy steels that are most suitable for Nitriding are known as

NITRALLOY

TWO INFORMATION BOOKLETS AVAILABLE ON REQUEST



Write for your copies—on your business stationery, please.

THE NITRALLOY CORPORATION

230 PARK AVENUE **NEW YORK, N. Y.**

Companies Licensed by The Nitralloy Corp.

ALLEGHENY LUDLUM STEEL CORP....WATERVLIET, N. Y.
BETHLEHEM STEEL CO.....BETHLEHEM, PA.
COPPERWELD STEEL CO.....WARREN, O.
CRUCIBLE STEEL CO. OF AMERICA....NEW YORK, N. Y.
FIRTH-STERLING STEEL CO.....McKEESPORT, PA.
REPUBLIC STEEL CORPORATION.....CLEVELAND, O.
THE TIMKEN ROLLER BEARING CO.....CANTON, O.
VANADIUM-ALLOYS STEEL CO.....PITTSBURGH, PA.
ATLAS STEEL LIMITED.....WELLAND, ONTARIO

Operating and Accredited Nitriding Agents

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COMMERCIAL STEEL TREATING CORP....DETROIT, MICH.
THE LAKESIDE STEEL IMPROVEMENT CO...CLEVELAND, O.
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LINK-BELT CO.....PHILADELPHIA, PA.
MET-LAB, INC.....PHILADELPHIA, PA.
NEW ENGLAND METALLURGICAL CORP., BOSTON, MASS
PITTSBURGH COMMERCIAL HEAT TREATING CO. PITTSBURGH, PA.
QUEEN CITY STEEL TREATING CO.....CINCINNATI, O.
WESLEY STEEL TREATING CO.....MILWAUKEE, WIS.
ONTARIO RESEARCH FOUNDATION TORONTO, ONTARIO, CANADA

Manufacturers of Nitralloy Steel Castings

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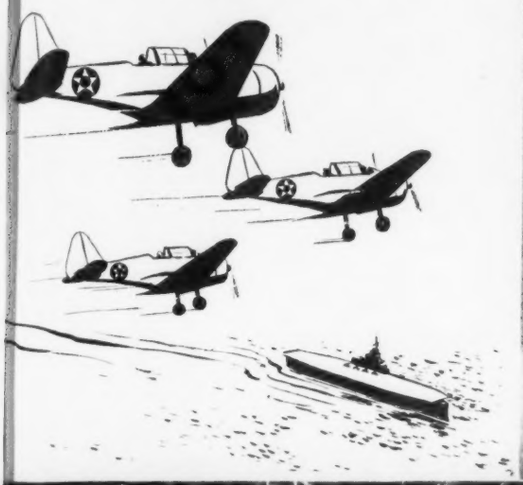
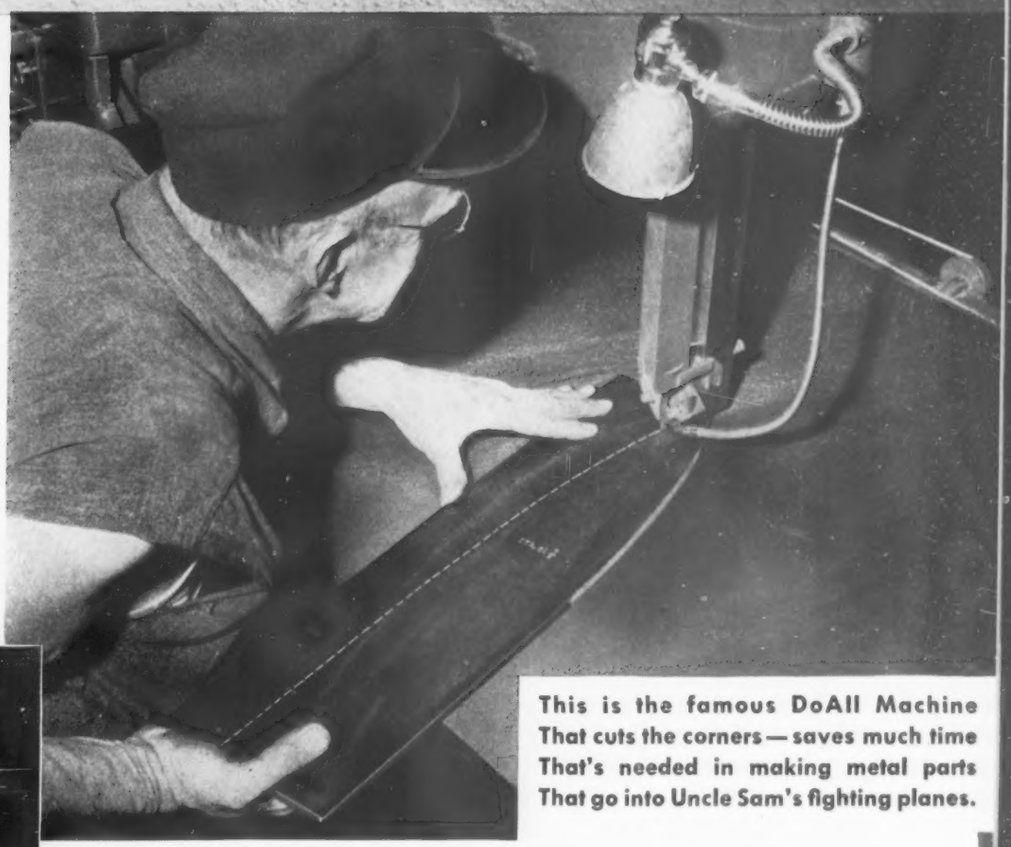
EMPIRE STEEL CASTINGS CO.....READING, PA.
THE MASSILLON STEEL CASTING CO....MASSILLON, O.
MILWAUKEE STEEL FOUNDRY CO.....MILWAUKEE, WIS.
WARMAN STEEL CASTING CO.....LOS ANGELES, CAL.

2175

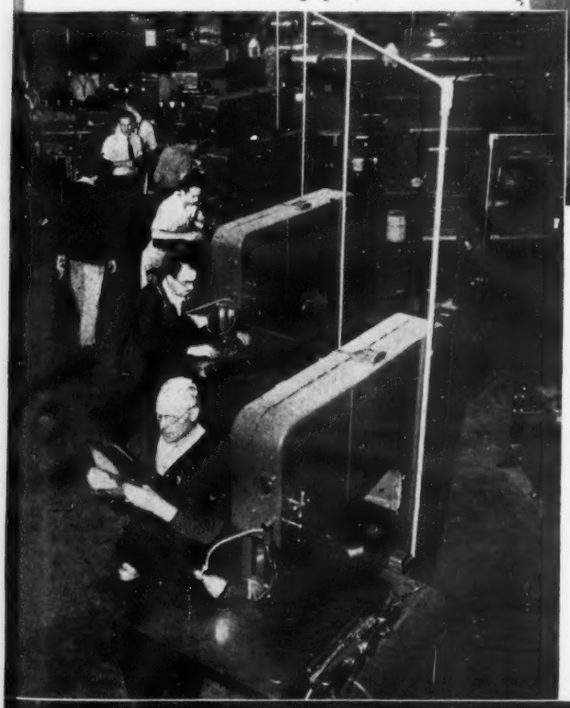
DoAll SPEEDS PRODUCTION

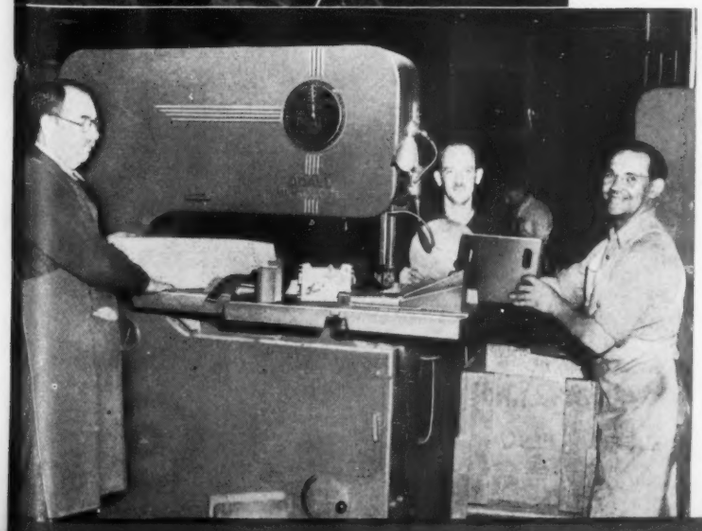
OVER THE SEA
IN PLANES





This is the famous DoAll Machine
That cuts the corners — saves much time
That's needed in making metal parts
That go into Uncle Sam's fighting planes.





DoAll and the THUNDERBOLT

Views on this page are taken at one of the Republic Aviation Corporation's plants, where the sensational new Thunderbolt is being made. Dozens of DoAlls are sounding the all-clear-ahead signal by shaping and finishing parts in a fraction of former time.

Every plant where man-hour and man-energy savings are essential needs the DoAll. Every metal worker instantly recognizes the value of this modern production tool.

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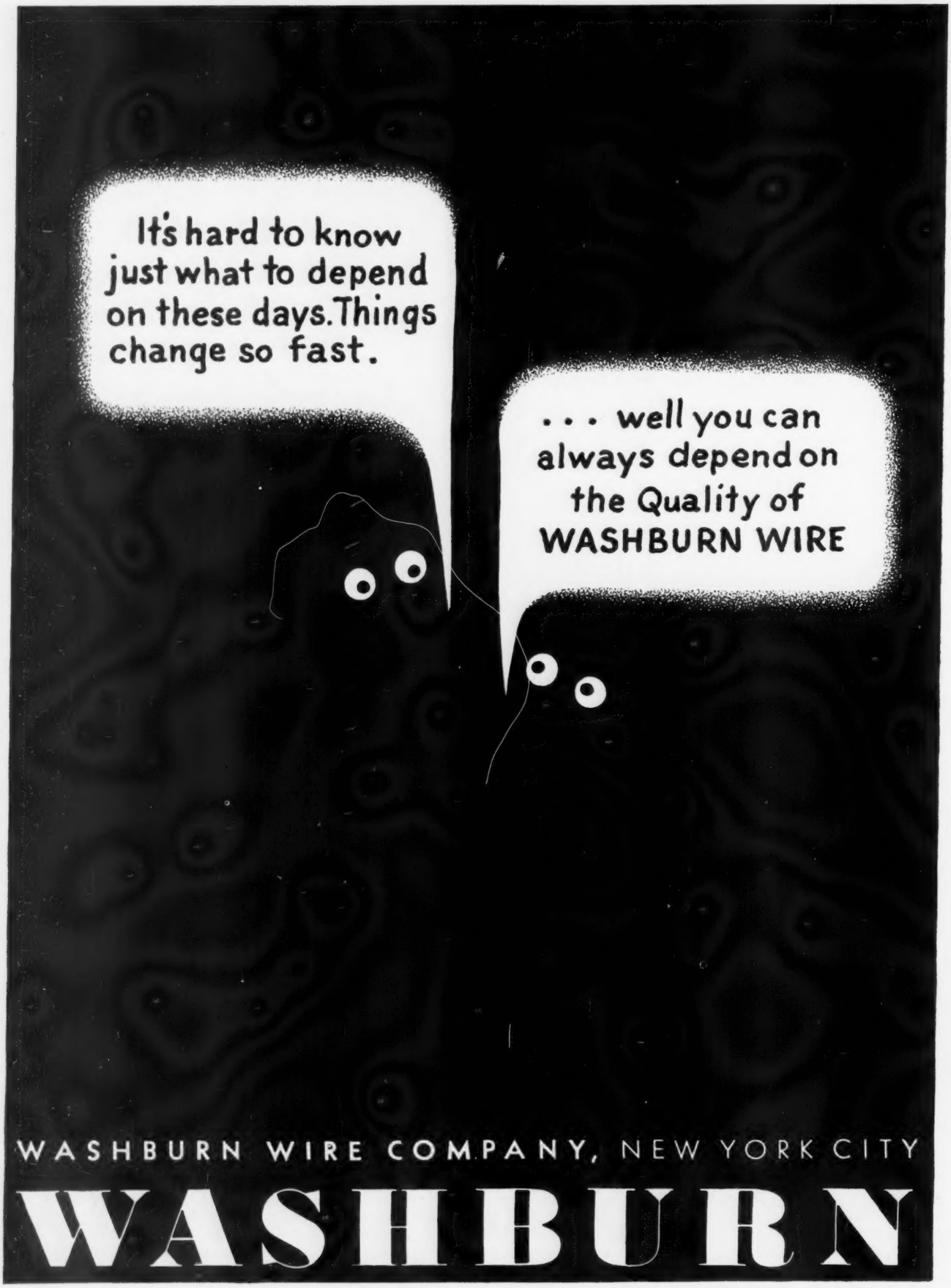
It's hard to know just what to depend on these days. Things change so fast.
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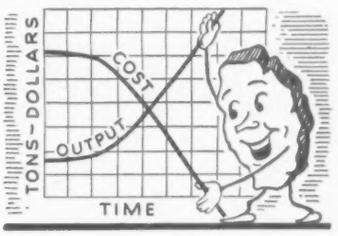

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If you want more information about these and the many other "Electromet" ferro-alloys and metals and the service that goes with their purchase, write for the booklet, "Electromet Products and Service."

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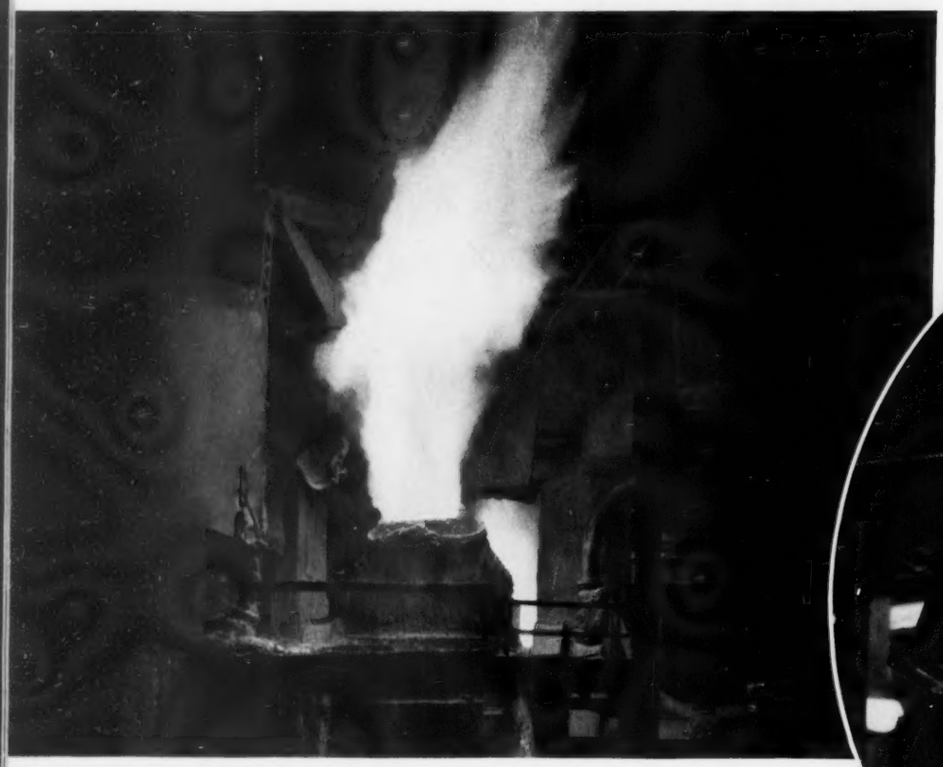
STEEL BARS

TO DO TRICKS



To be high in MACHINABILITY, steel must be processed to possess this quality from the very beginning of its manufacture. This is the practice rigidly adhered to in the manufacture of Union Cold Drawn Steels. From furnace to draw bench to final inspection table, the steel is under the close control of experienced men whose most important job is to obtain uniformly high MACHINABILITY.

REPUBLIC STEEL
PRODUCTION FOR VICTORY

DS

REPUBLIC Union Cold

"Trained from a Pup"

IN INCREASING PRODUCTION

If you want dependable performance from a dog, you begin to train it while still a pup—while it is raw material.

In the production of Union Cold Drawn Steels, we do practically the same thing. We begin our "training" of the steel with the raw materials—the iron ore, coke and limestone—and we continue to "train" the steel—to keep it under close controls in the furnace, soaking pit, blooming and bar mills, and, finally, during the cold drawing operations.

Throughout every process of manufacture, metallurgists who know from experience what it takes in steel to develop the *uniformly high MACHINABILITY* so important in steel parts production, carefully check each heat as it moves from step to step in its manufacture. Samples are thoroughly tested in the laboratory —and any heat that cannot meet Union Drawn's rigid specifications is promptly rejected.

Vigilant control—from ore yard to final inspection table—is one of the important reasons why you can always expect consistent uniformity in machinability, accuracy, physical properties, long tool life, smooth machined surface and heat-treating properties from Union Cold Drawn Steels—bar after bar and shipment after shipment.

Another reason for the high degrees in which these qualities are found in Union Cold Drawn Steels is the relentless research conducted year after year by Union Drawn metallurgists and engineers. You'll find these men in steel parts plants studying today's requirements and the behavior of steels when machined or heat-treated. You'll find them in the laboratory, too—applying their training and field experience to the ever-present task of increasing *MACHINABILITY*.

They've met with success in both places—as demonstrated by the long series of improvements in Union Cold Drawn Steels—and by increases in output, better quality and lower costs for steel parts producers with whom they have cooperated. Today, the reputation of UNION FREECUT is firmly established as a free-machining Bessemer steel—and UNION SUPERCUT is the fastest-machining Bessemer screw steel made today.

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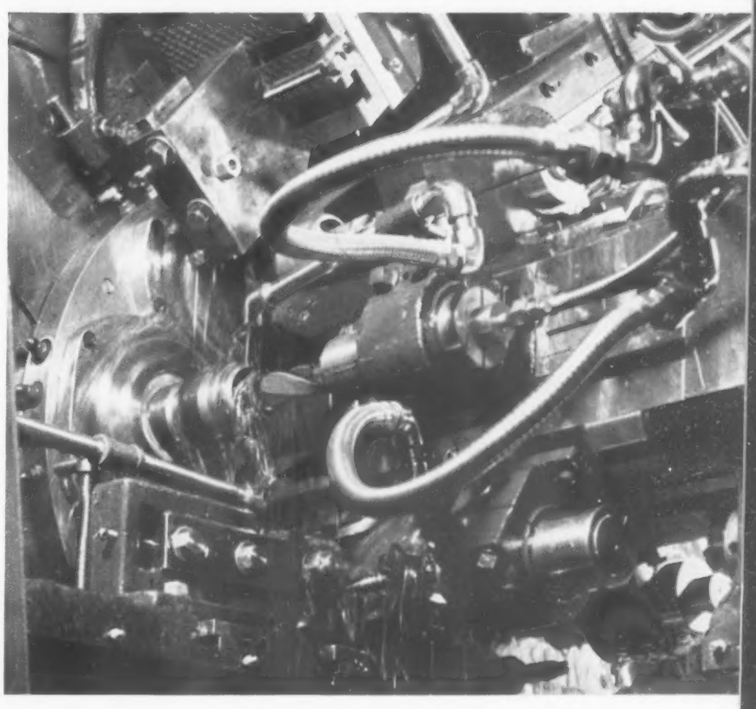
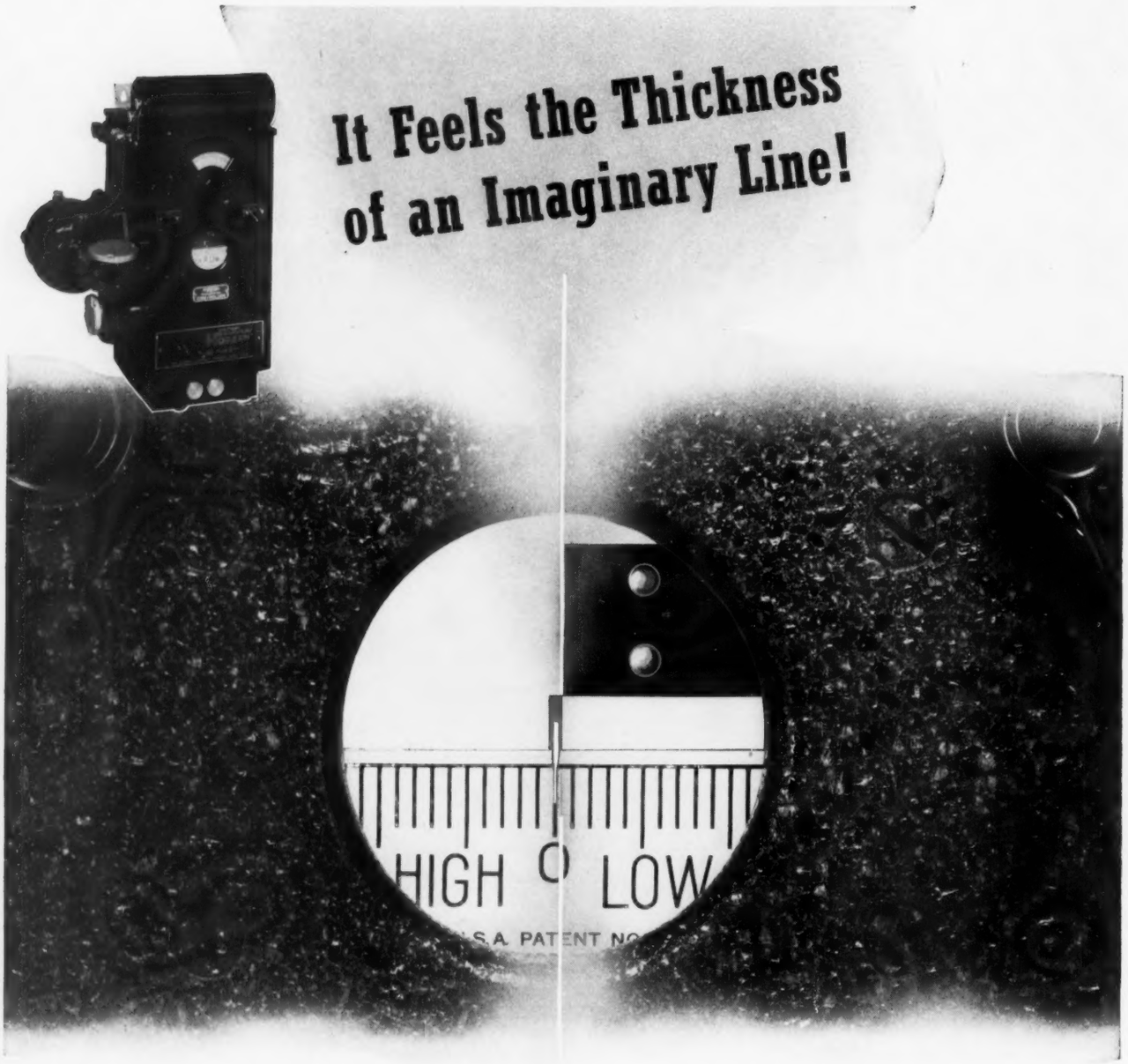


Drawn Steels

Free-Machining Bessemer, Open-Hearth and Electric Furnace Steels
•
Union Cold Drawn Special Sections
•
Union Cold Drawn and Ground Rounds; Turned and Polished Rounds; and Turned, Ground and Polished Rounds (Union Precision Shafting).



High-temperature processes are too important today to take any chances on pyrometer detecting-mechanisms that leave latitude for vital temperatures to go astray. That is why so many modern defense plants are installing Foxboro Potentiometer Controllers.

The Foxboro method of detecting temperature-change was chosen for its exceptional sensitivity and accuracy, combined with absolute dependability. Foxboro Knife-Edge Detection "feels" galvanometer deviations right down to the width of an imaginary line. For, its control action is positively determined by the sensitive engagement or non-engagement of the sensing lever and the pointer!

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Write for Bulletin 202-4 . . . learn why leading wartime industries are re-ordering Foxboro by preference. **The Foxboro Company, 118 Neponset Ave., Foxboro, Mass., U. S. A.** Branches in principal cities of the United States and Canada.

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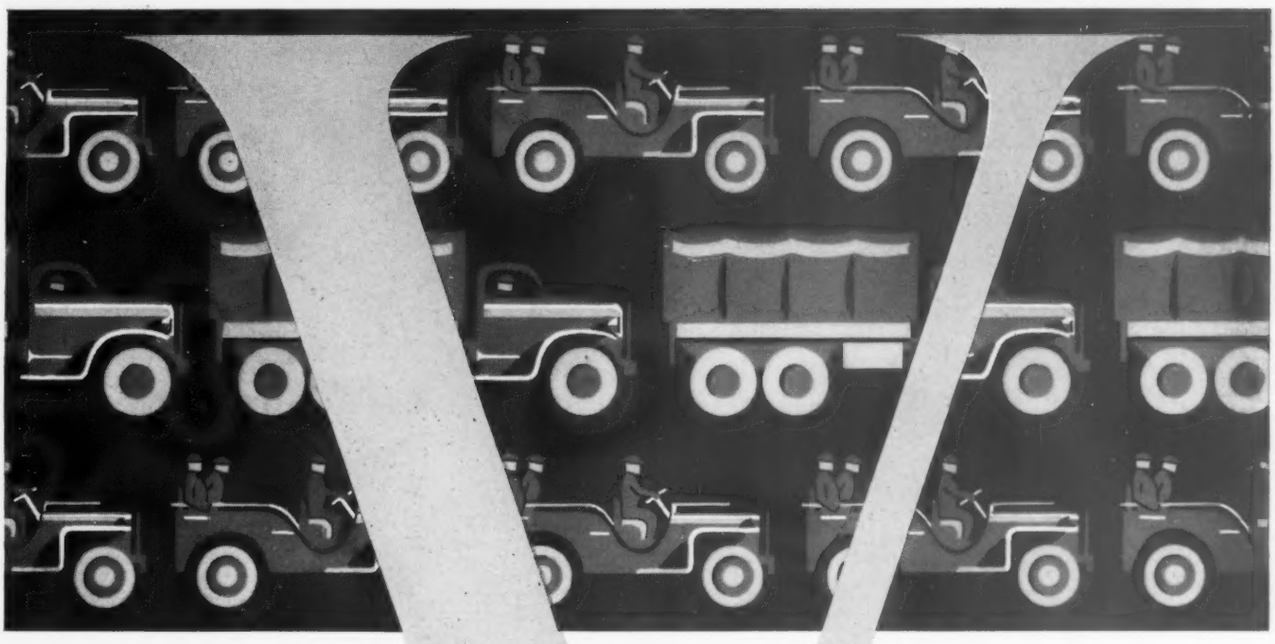

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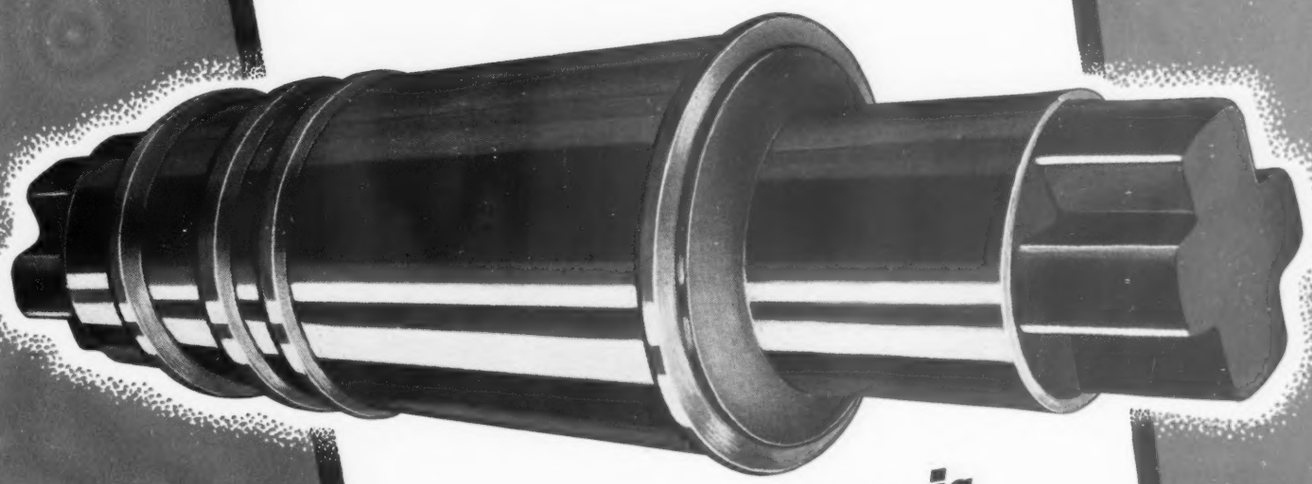

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● The strict control of critical war materials has but one primary purpose—to assure America's armed forces of the world's best fighting equipment! There must be no shortage of quality here. And this applies as well to the machine tools that turn vital parts for planes, tanks, and other weapons.

Despite our greatly increased production, the same high standards of workmanship and materials are being rigidly maintained throughout the standard line of Gisholt Turret Lathes. We believe that *now* this quality control is more important than ever. Gisholt Machine Company, 1217 E. Washington Avenue, Madison, Wisconsin.

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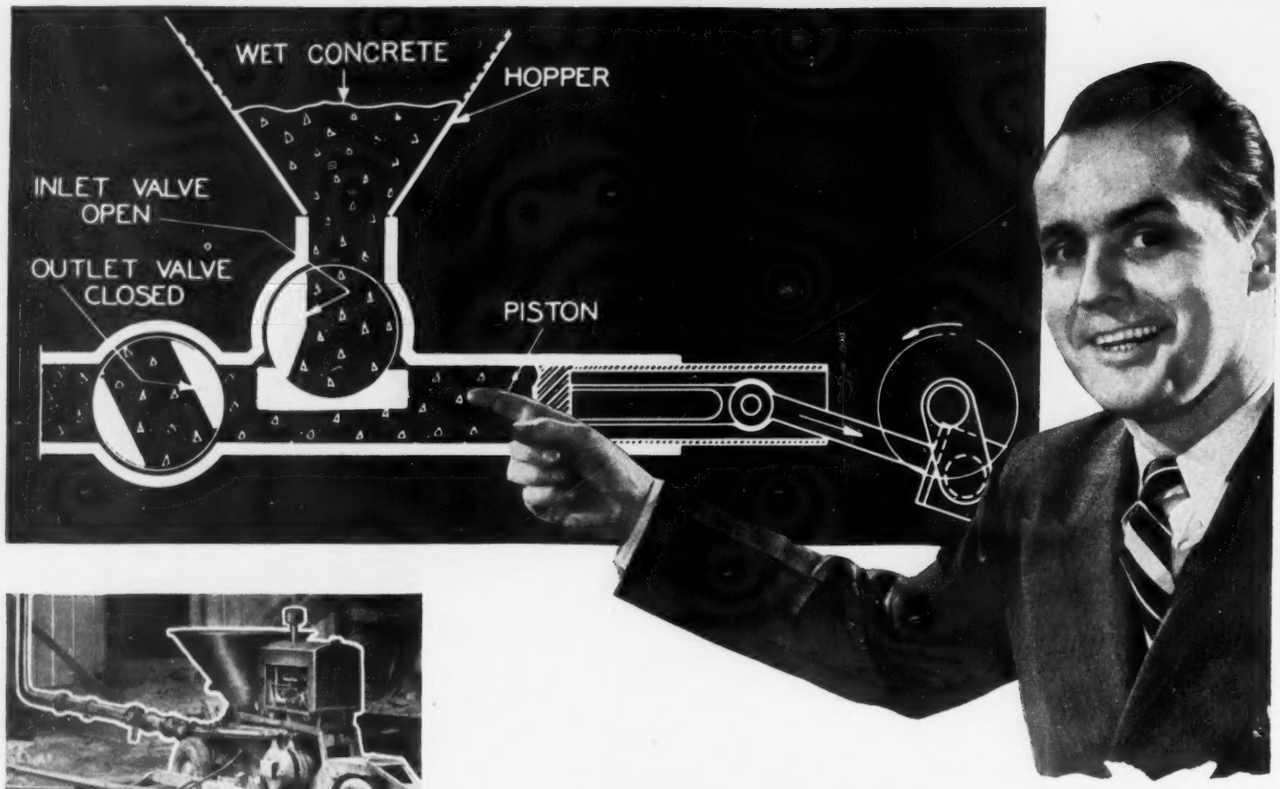

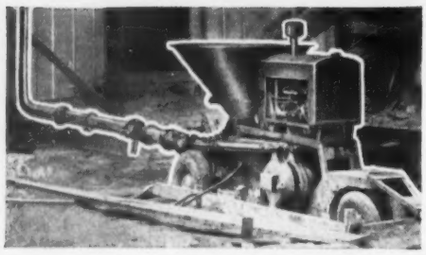

The Rex Pumpcrete actually pumps concrete through a pipe line. The diagram above shows how concrete is fed from hopper into valve chamber; drawn into cylinders by suction stroke and expelled into pipe line by pressure stroke. The ability of "Hartung" to withstand the severe abrasion of sand, cement, and stone under pressure means lower operating and maintenance cost.

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No other welding service offers you these advantages: (1) A single control for welding current with automatic arc response for all classes of work, (2) Square frame design enabling you to stack machines on top of each other. Operated singly or in parallel, you have the capacity to handle any welding job, small or large. Write for complete information.

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Here's abrasive action at its worst: raw concrete worked and pumped under pressure! Yet this severe abrasion is successfully overcome at two points in this valve chamber by coating the exposed parts with P&H "Hartung."

This tungsten molybdenum electrode was chosen in competitive tests because of the ease of applying it in all positions, its uniform weld hardness, and because weld thickness can be so accurately controlled.

With a hardness of from 55 to 60 Rockwell "C" in its as-welded state, "Hartung" provides a wear-hardened crystal finish surface wherever resistance to abrasion is essential. Try it on your next hard surfacing job and compare results. Write for information and procedures on P&H "Hartung."

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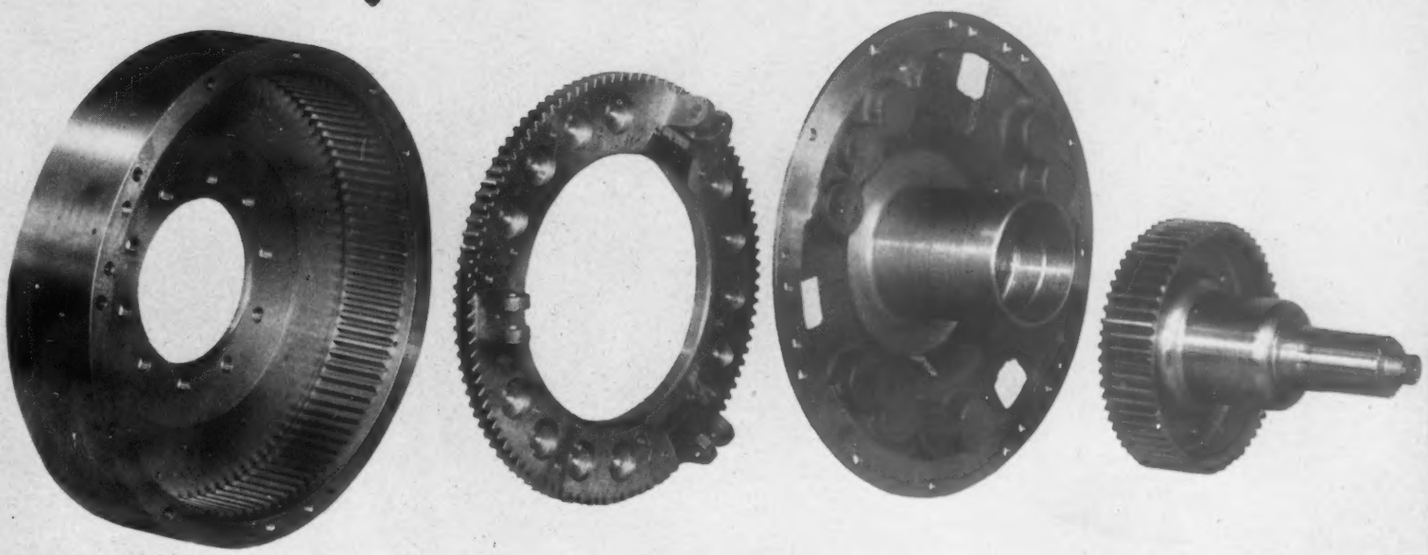

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It would be hard to imagine punishment more severe than that absorbed by the clutch in an army tank.

Naturally, the engineers who design these failure-proof war machines specify steel castings for the clutch parts that must stand up under such exacting service.

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No other material brings you all these advantages: resistance to high pressures, high temperatures and metal fatigue, economical weight distribution, time saved in finishing and assembly, wide range of mechanical properties, easy hardening to suit varying job requirements.

Steel castings make possible up-to-date streamline designing, and often bring about significant cost reductions.

When you seek ways of modernizing and improving your product, discuss the subject with your own foundryman, who is anxious to give you the benefit of his experience. Or you may, without obligation, write the Steel Founders' Society, 920 Midland Building, Cleveland, Ohio.

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Milwaukee Model K Plain Milling Machine

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STEEL

ESTABLISHED 1882

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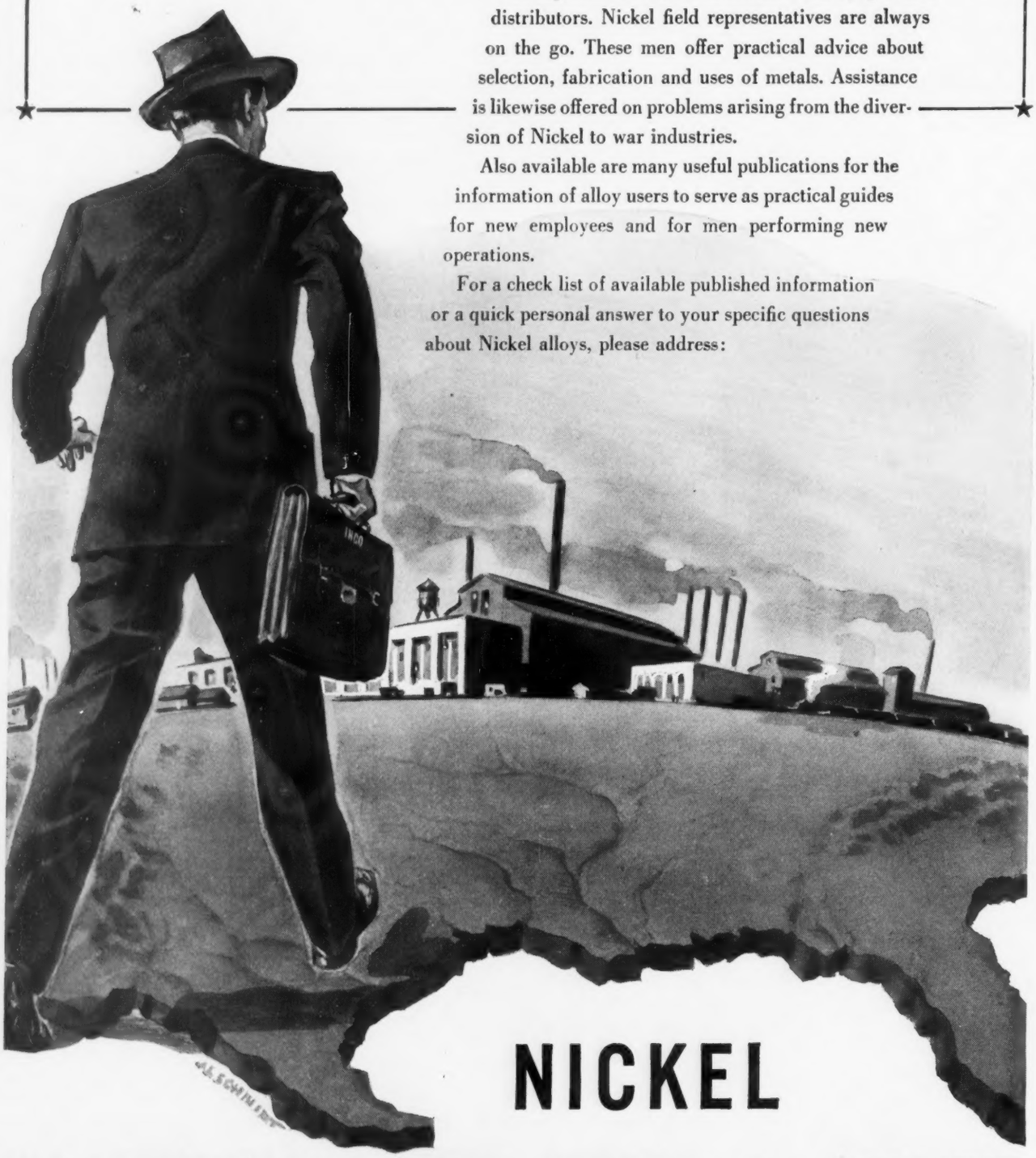
PRODUCTION • PROCESSING • DISTRIBUTION • USE

ON THE MARCH to aid users of alloys...

FIELD offices are maintained by International Nickel's Development and Research Division and by qualified distributors. Nickel field representatives are always on the go. These men offer practical advice about selection, fabrication and uses of metals. Assistance is likewise offered on problems arising from the diversion of Nickel to war industries.

Also available are many useful publications for the information of alloy users to serve as practical guides for new employees and for men performing new operations.

For a check list of available published information or a quick personal answer to your specific questions about Nickel alloys, please address:



NICKEL

THE INTERNATIONAL NICKEL COMPANY, INC. 67 WALL STREET NEW YORK, N. Y.

HIGHLIGHTING
THIS ISSUE OF
STEEL

SMALL manufacturers desiring war work, not only to help their country but to make sure that they will stay in business, are given a brief outline **(p. 59)** as to how to proceed in order to get such business. Many small plants, through the exercise of initiative, determination and ingenuity, have been converted; many more will be converted. STEEL **(p. 30)** tells pictorially how a manufacturer of aluminum floor waxers switched over to gun mounts. Don L. Miller **(p. 61)** offers some good advice on conversion. The rapidly increasing interest in conversion is reflected by last week's meeting of governors of western states with the Chicago District Ordnance Office **(p. 34)**. Donald M. Nelson says **(p. 43)**: "Production can be doubled with present facilities".

• • •

Bureau of Industrial Conservation **(p. 38)** has commandeered entire stock in an automobile graveyard on refusal of the owner to sell at the OPA prices. . . . Postponement of the application of recent freight rate increases is requested **(p. 36)** . . . . The Price Control Act is held to legalize OPA price agreements **(p. 44)** . . . . C. E. Adams defines priority orders as they govern steel shipments **(p. 45)**; WPB provides for the sale of surplus stocks of the automobile industry; maintenance of adequate warehouse stocks is discussed. . . . Use of collapsible metal tubes is under study **(p. 56)**.

Freight Rate Delay Asked

• • •

The President is thinking about freezing wages **(p. 40)**. . . . A UMW local official accuses John L. Lewis of opposing the war production program **(p. 38)**. . . . High wages are limiting coal production **(p. 136)**. . . . Donald M. Nelson's plan for management-labor committees to expedite production already has led to some friction in the automobile industry **(p. 47)**; give the plan a fair trial, is the advice of E. L. Shaner, STEEL's editor-in-chief **(p. 29)**. . . . Gas masks may be manufactured only on government orders **(p. 42)**; scrap dealers are warned on the manufacture of solder; a simplified practice has been submitted to the air heating industry. . . . Maintenance of commercial airlines has rating of A-1-j **(p. 52)**.

Wages May Be Frozen

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The new war emergency alloy steels recently announced by WPB are given **(p. 72)**, with a table showing which of these can be used as possible alternates for significant alloy steels now in use. . . . A. H. Milnes concludes his study of aircraft forgings **(p. 68)**. . . . Electric strip heaters, explains Maxwell Greenler **(p. 82)**, are helping to keep ore moving in cold weather. . . . Absolute flatness demanded in sheets today emphasizes advances in roller levelers, described **(p. 84)** by Frank W. Robertson. . . . Plate edge preparation in ship construction is greatly facilitated by multiple-torch cutting setups **(p. 93)** which cut double-bevel and other forms in one pass.

New Alloy Steels

• • •

Not only is iron powder being used as a substitute for bronze to spread out our copper and tin supplies **(p. 98)**, but the iron powder itself is made by processing scrap iron. Professor Macconchie explains the unique methods employed. . . . A new elapsed-time meter indicates production times or tool life **(p. 102)**. . . . New testing facilities **(p. 66)** help develop equipment to guard against interruption of power to war plants. . . . "Walking" welding guns **(p. 70)** speed resistance welding operations by making 20 spot welds in 12 seconds. . . . New alloy composition and special heat-treating cycle **(p. 74)** eliminate need for refrigerating aircraft rivets and parts at Bell Aircraft Corp.

Iron Powder From Scrap

There is Magic in "Scrap"

Help Overcome the Critical Shortage!

Are you listening to America's call for scrap—scrap, the magic metal that can be melted and refined into steels for the fighting forces of America and her Allies?

Charging scrap into furnaces is not a new steelmaking method. It has been practiced for years, conserving millions of tons of valuable iron ore resources. Last year scrap collecting facilities made available 25,000,000 tons to help maintain the output of America's steel plants. The need is so urgent, however, that even greater effort must be applied so that all steelmaking furnaces can operate at full capacity.

Make a search for scrap throughout your plant. You may find discarded machinery, a rusty shaft, a broken rail, a twisted beam, an old boiler, an obsolete crane, an unused switch track, a steel trussed building too costly to repair and use. What about the "bone pile," where odds and ends have been rusting for years?

Possibly you can find only a few pieces of scrap, weighing only a fraction of a ton. **Start them on the way to a steel mill!** Your local scrap dealer, gathering a piece of scrap here, and one there, will soon fill a car. Carloads from other dealers will grow into a trainload. Trainloads arriving at mills will assure steel output at capacity.

Remember that 50 pounds of steel means another 105 mm. shell; 25 tons another tank; and, 25,000 tons will place a new cruiser and several cargo ships under the American flag.

Time and materials are precious to our men on the fighting fronts. Do not handicap them—answer America's call today—send your scrap to be refined into useful steel.

INLAND STEEL CO.

38 S. Dearborn Street, Chicago • Sales Offices: Milwaukee, Detroit, St. Paul, St. Louis, Kansas City, Cincinnati, New York

STEEL
March 16, 1942

ONE MORE STEP TOWARD NATIONAL UNITY

Donald M. Nelson's radio address of Monday, March 2, which was in effect a blueprint for more production now, has met with a gratifying response on the part of all groups identified with American industry. This response is reassuring in that it signifies that great progress has been made since Pearl Harbor in mobilizing industry for war — not only physically but also in the spirit of its personnel.

The only point in Mr. Nelson's program which did not receive an immediate, enthusiastic reception in most quarters was his suggestion to management and workers in plants engaged in primary war production "to set up joint management-labor committees within each plant to run this drive to push production up to and beyond the President's goals."

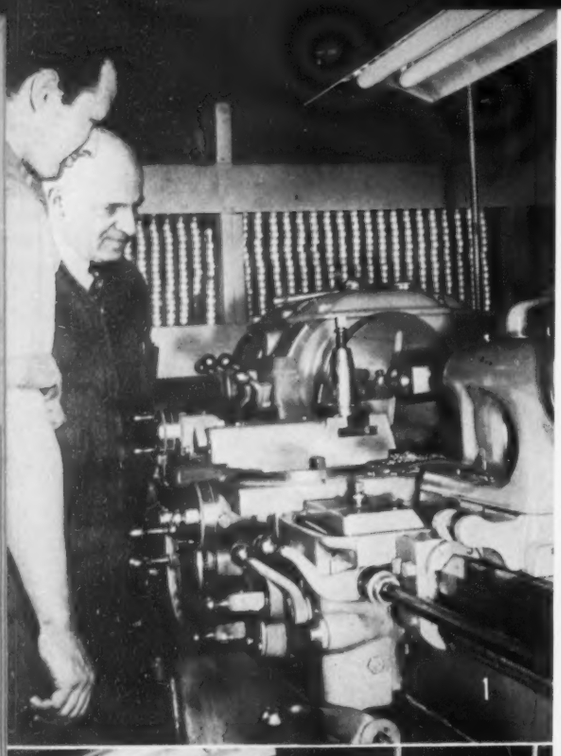
Notwithstanding the fact that Mr. Nelson indicated clearly throughout his address and in some subsequent statements that his idea of joint committees concerns itself solely with the problem of increasing production, there has been a tendency in some quarters to wonder whether such committees will confine their functions to production matters. Some persons, apparently thinking of past experiences with government policy on labor relations, wonder whether the joint committees may afford unions further opportunities to strengthen their position.

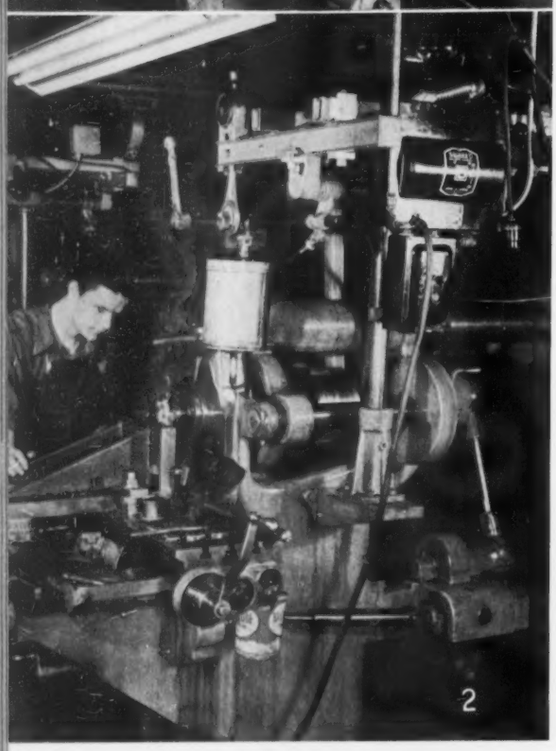
Unfortunately, the attitude of certain branches of the government in recent years has been such as to justify these suspicions. On the other hand, the critical status of the nation's war effort has caused the people to take a more realistic view of the labor situation. As a result, responsible union leaders have been more cooperative in recent weeks. The President has been more insistent that labor not abuse its privileges. The first two of his three "high purposes for every American" were "we shall not stop work . . . ." and "we shall not demand special gains . . . ." — purposes pointedly applicable to union policy.

National thought and action now are moving swiftly into more constructive channels. A little more disposition to trust the other fellow's motives will help to crystallize the spirit of unity which this nation must have to achieve victory.

Mr. Nelson's proposal of joint shop committees, if taken in good faith by all concerned, may help tremendously, not only in increasing production for war, but also in promoting unity.

E. L. Shaner
Editor-in-Chief





"One tank NOW is worth ten a year from now"—Nelson

FLOOR WAXERS

Another Typical Example

FROM FLOOR waxers to small gun mounts—a phrase that means much, yet says so little. One that sums up the "all-out" efforts of a small manufacturer and his personnel now busily engaged in turning out vital gun parts for the armed forces in eastern United States—the "hotbed" of Yankee ingenuity, yet does not tell of the hours spent by the factory's owner in seeking and obtaining sub-contracts many months ago. Nor does it relate how, in face of the shortage of new machine tools, the owner succeeded in converting old machines to do the new work, how he succeeded in increasing his working force from 3 to 30 workers and how he extended the operating time of the tiny plant from 8 to 22 hours per day.

Converting the facilities of this factory formerly engaged on aluminum floor waxers to production of gun parts was a job, and the owner knew it. But he did not hesitate. With the aid of the then meager personnel, he bought, installed and remodeled old machinery to meet sub-contracting requirements. Thirty days later he began delivering on his first orders, an amazingly short time considering that the conversion of the machines alone took two weeks, and also that the orders were being turned out by former elevator operators, weavers and white-collar workers. The accompanying illustrations tell more than words how this company is operating today to aid the national effort. All photos from the Office of Emergency Management, by Hollem.

Any manufacturer who can benefit by having additional information about this conversion job, or who feels he is in a position to make the conversion even more efficient and effective, can get details from the nearest Ordnance District Office.

—The Editors

Fig. 1—Through the skill and ingenuity of the "small but mighty" personnel of this Yankee firm, machinery formerly used in production of floor waxers now turns out war essentials. Shop's owner, right, and night foreman both were instrumental in the transformation

Fig. 2—Now making machine-gun cover plates, this machine was converted from a line-shaft drive to motor drive. Unable to purchase new equipment for his war work, the plant's owner bought second-hand equipment and remodeled it. Delivery of first orders was made 30 days after contract—amazing considering it took 2 weeks to convert the machinery

Fig. 3—No more floor polishers—at least for the duration. Bench workers henceforth will be women if the owner's plans are realized so that his male operators can be released for heavy-duty machine work

TO GUN PARTS

of Yankee Ingenuity

Fig. 4—This is the small plant in which Yankee ingenuity "went to town." The owner is now operating it 22 hours per day with a crew of 30 workers, a distinct improvement over his previous 8-hour 3-worker days

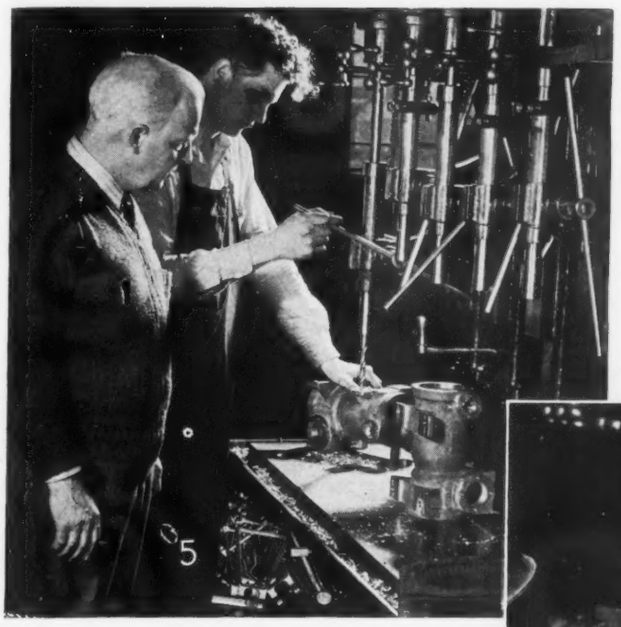


Fig. 5—Here the owner, left, is handing out a few "tips". The 5-spindle drill press shown, once adapted for making floor-waxing machines, is now equipped with a special chuck and drill for production of anti-aircraft guns

Fig. 6—This man used to weave and repair looms, but he's working for Uncle Sam now. He spends 99 per cent of his time working on small parts for gun mounts

Fig. 7—No—he's not drawing a bead on an enemy ship, but he's hitting at the Axis just the same. Formerly a WPA timekeeper, this employe also produces smal parts for America's war machine

"One tank NOW is worth ten a year from now"—Nelson

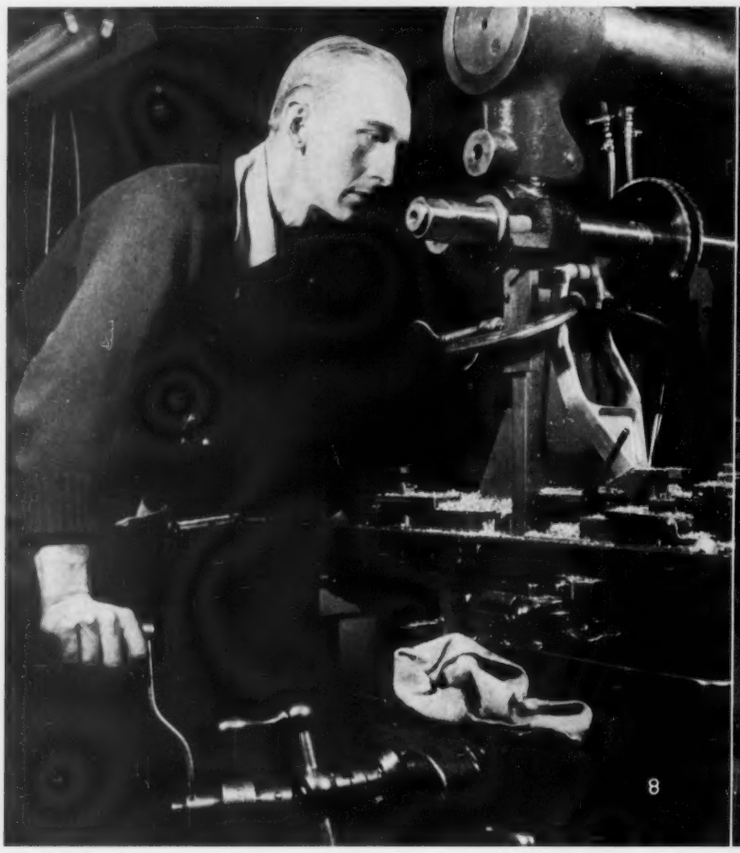


Fig. 8—Erstwhile elevator operator, this employe now finds a touch of similarity between levers of the old job and the new one. He's one of America's war production workers since this company went "all out"

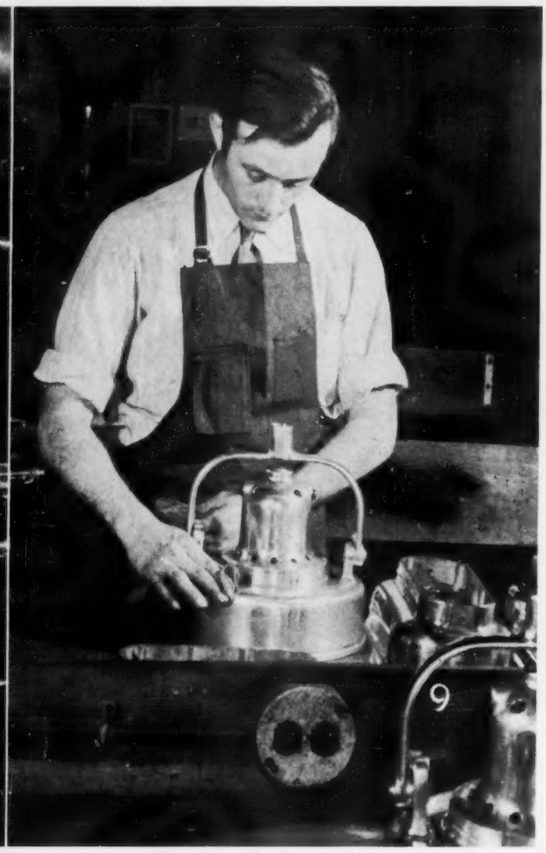


Fig. 9—Cleaning up: This man is working on the remainder of the floor-waxer stock left in the plant. Orders for the shop's peacetime products can still be filled from stock, but no new waxers are being made

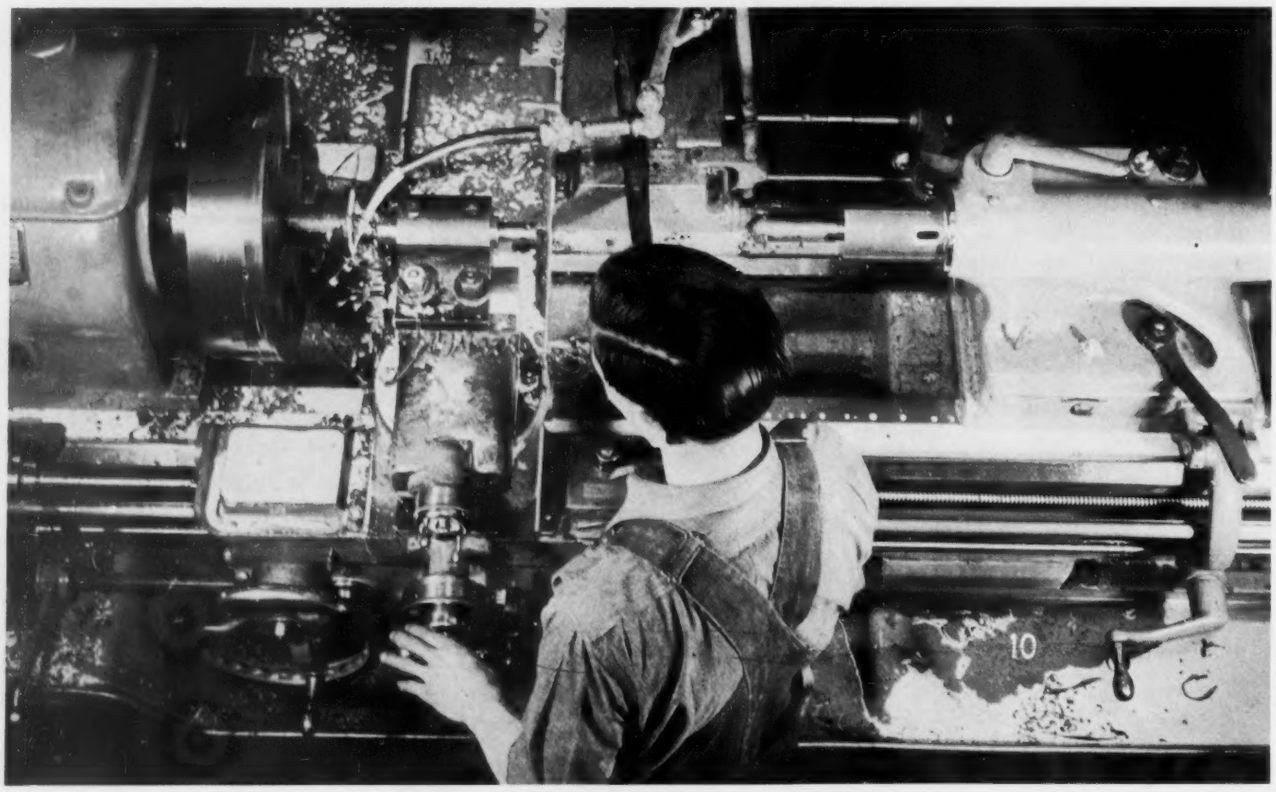
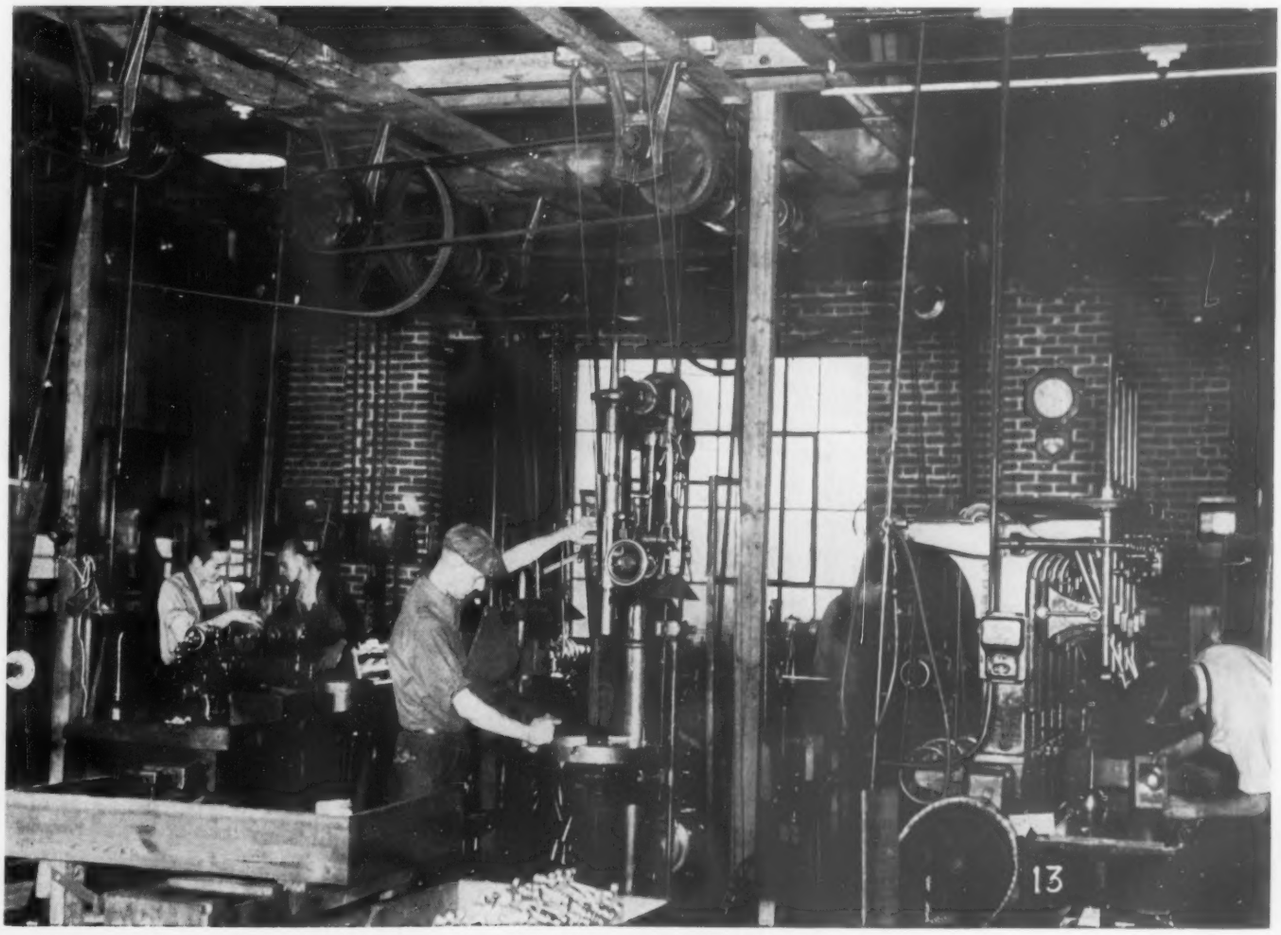


Fig. 10—One of the few new lathes bought by the plant. It is working side by side with remodeled old equipment

Fig. 11—The sugar shortage brought this worker back to the lathe. He only had a trade school course in mechanics, taken 15 years ago as background for his new job. He operated his own confectionery business until the sugar shortage forced him into a new field. But he's glad to be aiming gun-sight parts at the Axis

Fig. 12—A modern Molly Pitcher of the machine, this secretary-treasurer of the company knows as much about drills and lathes as the oldest employe around the place. And it was in part through her foresight and initiative that the plant was converted to war production. She's shown here with a youthful worker operating a converted machine

Fig. 13—Twenty-year-old lathes in action—producing equipment for Uncle Sam's armed forces 22 hours per day. This remodeled equipment is proving its mettle in '42. Note overhead power driven machinery



Midwestern Manufacturers Speed Conversion to War Output

◆

Governors discuss ways of spreading work to smaller shops. Co-operate with district ordnance officials . . . Washer and ironer manufacturers ask for more war work . . . Production pool awarded $200,000 contract

◆

CHICAGO

EXPANDED program to spread war contracts into small business channels was introduced here last week at a conference between governors of the midwestern states comprising the Chicago Ordnance District, and Col. Donald Armstrong, deputy district chief.

Governors Dwight Green, Illinois; Julius Heil, Wisconsin; Harold Stassen, Minnesota, and G. A. Wilson of Iowa, accepted Colonel Armstrong's invitation to appoint a representative to have quarters in the ordnance district offices and consult with and aid in distribution of war contracts to small businesses in their respective states. Governors of Indiana and South Dakota were not present, but they are expected to take similar action.

First appointment to this new board was made by Governor Green —Dean Charles M. Thompson, University of Illinois.

It was announced by ordnance officials and the governors that an immediate survey of all the machine tools and machine tool hours available would be made and that representatives of the governors would keep the ordnance district informed of changes.

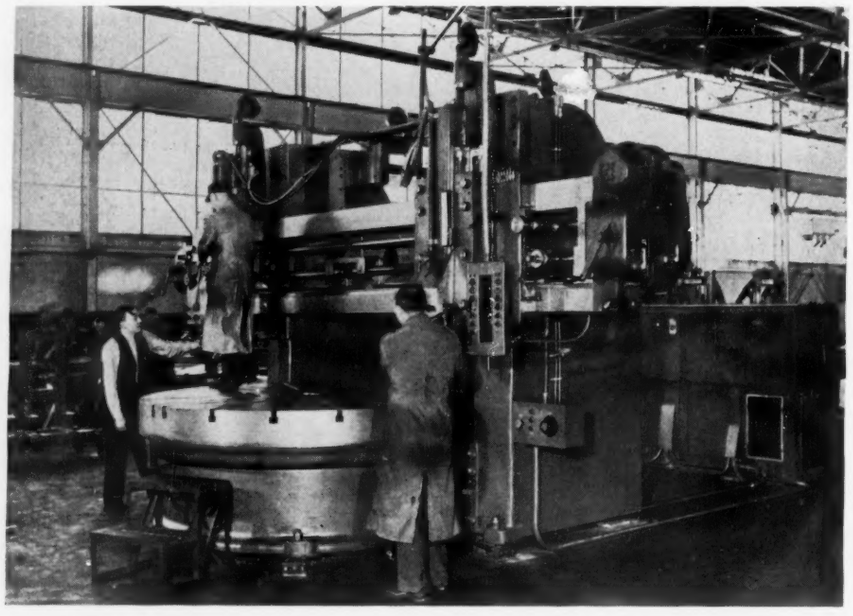
Pointing out that the Chicago Ordnance District has let some $1,400,000,000 of orders and that the total will be lifted to $2,000,000,000 within the next few months, Colonel Armstrong said with the governors' help "we will continue to do a better job in the future in spreading contracts and subcontracts among small businesses."

Indicating the desire to lend aid to small business, Colonel Armstrong announced that Frederick A. Virkus, head of the Illinois division, National Small Business Men's Association, has been appointed a member of the advisory board of the Chicago Ordnance District.

Confer on Farm Industry

Ways to speed conversion of farm implement plant facilities to war production and methods to meet growing farm requirements for tools and equipment were discussed here March 12 in informal conferences between WPB officials and members of the Farm Equipment Institute.

The industry was reported to have asked for increased quotas on production of certain equipment needed by farmers. Manufacture of most implements and machinery has been limited by the WPB to conserve critical materials and to lease plant capacity for war work.



WORKMEN at Fisher Body Co., Detroit, are putting the finishing touches on the first vertical boring mill produced by the company to be used in the manufacture of tanks. Company, which is building 100 and 112-inch boring mills on direct order from the government, completed this unit in barely more than two months after the contract was received

Farm equipment production for 1942 has been set for an overall average of 83 per cent of 1940 output, or about 60 per cent of 1941.

William R. Tracy, chief of the Farm Equipment Branch, and C. E. Frudden, consulting engineer for the branch, were the WPB representatives at the conference. Among representatives of the farm equipment industry were Fowler McCormick, president, and J. L. McCaffrey, vice president, respectively, International Harvester Co., Chicago; W. A. Roberts, manager, tractor division, Allis-Chalmers Mfg. Co., Milwaukee; and G. L. Gillette, vice president, Minneapolis-Moline Power Implement Co., Minneapolis.

Mr. Tracy stressed need for maintaining existing farm equipment in repair and discouraging farm purchases of unnecessary new equipment. Frank J. Zink, research department, Farm Equipment Institute, Chicago, reported that demand for such equipment as tractors, combines, corn pickers, and cultivating machinery, has been heavy.

Chicago Production Pool Awarded $200,000 Contract

First war contract in the Chicago Ordnance District between a prime contractor and members of a production pool has just been negotiated here with aid of district officials. The order, for $200,000 worth of tank parts, will be distributed to two members of Metal Fabricators Institute, 176 West Adams street, a pool of 33 small manufacturers, and to several non-members.

Ellsworth H. Johnson, executive secretary of the institute, states: "By obtaining this subcontract and subcontracting it again in turn, we believe we are proving the value of the pool organization in the war effort."

Small businessmen haled the development as being of great significance for small business on the ground that it marks first concrete recognition by the ordnance district of the value of the pooling principle in the handling of war orders.

No new machinery or plant space will be needed by the companies undertaking the order, Mr. Johnson explained. The pool recently was responsible for allocating of a $50,000 order for ammunition boxes to a member firm as part of a large Navy order. The pool, however, in this instances did not negotiate the contract in its own name.

According to Mr. Johnson, performance bonds do not offer any serious problems to pools, since such bonds either are unnecessary where performance is a matter of past record, or easily are obtainable if the pool or its members are to be awarded a contract. In the case of the tank parts order, no bond was necessary, for the order was a subcontract. In the case of the Navy order, the company which took the contract posted its own bond.

The action of the ordnance district in bringing the prime contractor and the pool together consisted chiefly in furnishing the pool with specific information concerning the contract and the needs of the prime contractor.

Up to now, none of the 22 pools in the Chicago Ordnance District has been awarded a prime contract. Pools, to be recognized by the district, must be cleared and certified to the district by the WPB and Department of Justice. To date, only four of the 22 have been so certified; namely, Chicago Defense Association Inc.; Metal Fabricators Institute; Garfield Park Industrial Group; and Industry Associates Inc., Des Moines, Iowa.

Cites Auto Dealers as Machine Tool, Skilled Labor Source

A large untapped supply of machinery, skilled mechanics and manufacturing space which can be used in the war effort is lying idle in the 40,000 automobile dealer shops.

Extent of these available facilities,

THESE pictures—approved by the government last week—afford graphic evidence of how some automobile plants look "before and after conversion". On Jan. 30 finished motor cars were coming off the Plymouth assembly line at the rate of three a minute, as shown at the top. The last car was off the line at noon, Jan. 31. The lower photograph was taken Feb. 20, after hundreds of machines had been installed and parts for guns, tanks and aircraft were being turned out in volume

A 192,500-POUND ingot is placed in a press at Allis-Chalmers Mfg. Co.'s plant, Milwaukee, after two weeks of heating to bring it to a temperature of 2200 degrees Fahr. Measuring 76 inches, it is believed to be one of the largest ever forged in the Middle West. After forging and machining, it will become a rotor for a large synchronous condenser

valued at upwards of $500,000,000, was revealed last week by a nation-wide survey of dealer establishments submitted to the WPB by Joseph W. Frazer, president, Willys-Overland Motors, Toledo, O.

On the basis of the Frazer survey, which covered all automobile dealers in the country, engineers estimate that if all existing machines in auto shops were pooled, a hypothetical arms factory of more than 250,000,000 square feet could be constructed. This would employ more than 185,000 skilled mechanics and would be equipped with more than 18,000 lathes, 15,000 grinding machines, 1400 shapers, almost 16,000 drilling machines, 52,000 welding units, 40,000 buffing machines and 1600 screw machines. It would also have a vast amount of miscellaneous equipment, all of which might be harnessed to the war effort.

Actual machines listed in the survey, according to Mr. Frazer, are similar to thousands now being used in England's successful "bits and pieces" program which has brought small shops into the war effort.

Washer, Ironer Industry Asks Full War Program

American Washer and Ironer Manufacturers' Association, which represents 95 per cent of the industry's capacity, met last week and voted unanimously to notify the WPB of its desire to turn its factories completely over to war production. The $12,000,000 contract for machine gun parts, which the government awarded the industry recently, only partially engages productive facilities. Furthermore, orders to cease the restricted manufacture of washing machines and ironers are expected momentarily.

Exemptions in Freight Rate Rise Asked by OPA

WASHINGTON

TO PREVENT a 6 per cent increase in railroad freight rates on a large number of commodities on which it described price structures as "extremely sensitive", the OPA last week asked the Interstate Commerce Commission to postpone the effective date from March 18 to April 15.

In the meantime, the OPA said, it will conduct negotiations with a committee from the railroads with a view to exempting these commodities from the freight increase.

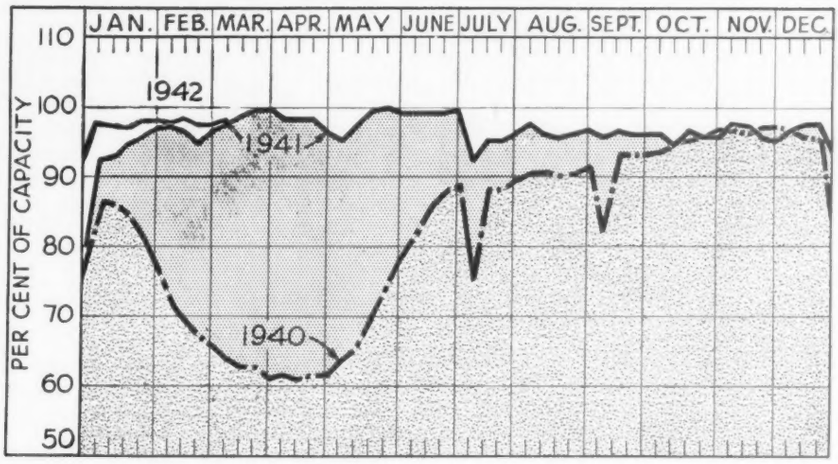
The list on which exemptions are asked include: Pig iron, cement, copper ores and concentrates, iron and steel scrap, lead ores and concentrates, lumber and lumber products, petroleum and a long list of petroleum products including fuel and heating oils, nonferrous scrap, copper and lead including scrap battery plates, asphalt for roadmaking and roofing, and rubber scrap.

OPA stated that "under ordinary circumstances the general increases permitted could be allowed to become effective without serious harm, leaving adjustments on particular commodities to be negotiated and effected subsequently. Insofar as the effect of this method of procedure upon the price control, which is our duty, however, ordinary circumstances do not obtain."

Increases upon the commodities mentioned must not be permitted to become effective even for a short while pending negotiations with the railroad committee, OPA stated. It said that price ceilings have been established upon all of them but that an increase of 6 per cent in transportation costs via the carriers on these commodities would necessitate immediate upward revision of their price ceilings.

The OPA said further that "aside from the tremendous administrative burden of such revision, it would be extremely difficult if not impossible to regain the ground lost and effect a downward revision corresponding to a subsequent exemption of the commodities wholly or partially from the increase permitted."

Joseph B. Eastman, director, Office of Defense Transportation, said his office has no interest in the inflationary aspects of railroad rate increases but that he is interested in the proposed adjustment of freight rates on the movement of traffic from the Gulf ports to the Eastern seaboard.



PRODUCTION . . . . Down

PRODUCTION of open-hearth, bessemer and electric furnace ingots last week declined 1 point to 95½ per cent. Three districts advanced, six declined and three were unchanged. A year ago the rate was 98.5 per cent; two years ago it was 62½ per cent, both computed on the basis of capacity as of those dates.

Youngstown, O. — Advanced 3 points to 94 per cent with 74 open hearths and three bessemers in production. This week the rate probably will go to 95 per cent as another open hearth is added by Republic Steel Corp. Better scrap supply caused in the increase.

St. Louis—Following better scrap receipts additional capacity was engaged, causing an increase of 5½ points to 83½ per cent.

Buffalo — With 34 of 43 open hearths in production the rate continues at 79½ per cent for the tenth week. Scrap shortage prevents relighting idle furnaces.

Cleveland—Removal of one open hearth was not compensated by a slight gain by another interest, causing a decline of ½-point to 91 per cent.

New England—Unchanged at 95 per cent for the third week.

Pittsburgh—Net loss of ½-point to 95 per cent resulted from shifts in steelmaking units.

Wheeling—Scrap shortage caused production to decline 4 points to 81.5 per cent.

Central eastern seaboard — Declined 2 points to 88 per cent after holding at 90 per cent for seven weeks. Scrap shortage caused the drop.

Detroit — Return of one open hearth to service caused the rate to rise 3 points to 87 per cent.

Birmingham, Ala—For the fifth week production remained at 95 per cent, with 23 open hearths in operation.

Cincinnati—Closing of one plant for repairs and extensions caused a drop of 14½ points to 80 per cent. Work will be resumed this week.

Chicago—Dropped ½-point to 103 per cent resulting from realignment of furnaces because of repairs.

District Steel Rates

Percentage of Ingot Capacity Engaged In Leading Districts

	Week ended Mar. 14	Change	Same week 1941	Same week 1940
Pittsburgh	95	— 0.5	100.5	55
Chicago	103	— 0.5	99	59.5
Eastern Pa.	88	— 2	96	60
Youngstown	94	+ 3	97	42
Wheeling	81.5	— 4	88	80
Cleveland	91	— 0.5	98	73
Buffalo	79.5	None	90.5	51
Birmingham	95	None	90	78
New England	95	None	92	70
Cincinnati	80	—14.5	89	54.5
St. Louis	83.5	+ 5.5	93	60
Detroit	87	+ 3	93	82
Average	95.5	— 1	*98.5	*62.5

*Computed on steelmaking capacity as of these dates.

Farm Scrap Drive Yields Tons of Waste Metal

INTERNATIONAL HARVESTER Co.'s campaign to collect scrap metal from farms all over the country is reported to be making rapid progress. Opening day in some localities resembled community celebrations. In St. Peters, Mo., where this photograph was made, 45 to 50 tons of scrap was brought to town the first day by farmers and farm boys and girls. A survey in one Illinois territory found farmers agreed that if all the scrap available were collected from their farms it would average one to three tons per farm

Republic's Newton Falls Plant To Be Re-Equipped

Republic Steel Corp. will proceed with installation of new machinery and equipment in its Newton Falls, O., steel plant for the manufacture of defense equipment, it announced last week.

Except for some foundry operations which have been housed at Newton Falls and which will be continued there, and some use of the buildings for miscellaneous storage, this plant practically has been idle for over five years. Most of the steelmaking equipment and furnaces were dismantled some time ago, which will serve now to expedite erection of machinery required for the new program. When in full operaton, several hundred persons will be employed.

Kaiser To Build Iron, Steel Plant On West Coast

CONSTRUCTION of a new iron and steel plant will be started within the next ten days by Kaiser Co. Inc., Oakland, Calif. Plant will be located in the West, according to authoritative sources.

Plans call for a 1200-ton blast furnace, four open-hearth furnaces, and a 110-inch sheared plate mill.

Iron ore analyzing in excess of 60 per cent iron content, and limestone and coke will be obtained from points near the new plant.

Further details have not been revealed.

WPB Takes "Jalopies" In Valparaiso Yard

Entire stock of wrecked automoblies on a lot near Valparaiso, Ind., has been requisitioned by the WPB Bureau of Industrial Conservation, putting into effect for the first time its announced plan for dealing with recalcitrant operators of automobile graveyards.

Action followed refusal of the yard owner to accept what were described as fair offers for his obsolete cars and miscellaneous metal scrap. Two steel companies had bid for the material.

The yard owner, Frank Schumak, was described as "openly defiant" in his attitude, and is said to have declared he would not accept less than $22 a ton for his stock, although the OPA maximum for such metal in the Chicago area is $18.75, delivered to mills.

The requisitioned metal represents only about 150 tons of potential scrap.

Requisitioning order was presented to Schumak by an United States marshall, and the metal hauled away by steel company trucks. Metals Reserve Co. will pay the owner a fair price for the material.

LABOR

UMW Members Form "Victory Committee"; Criticize Lewis

Sixty members of New Jersey locals of the United Mine Workers, tired of waiting for UMW President John L. Lewis to advance a program for accelerating war production, have organized a "victory committee" for that purpose.

Charles Davey, UMW local official and chairman of the committee, said the committee was set up in the face of warnings by Lewis' personal emissaries that participants faced dismissal from their union posts if they joined in the revolt against the UMW president. Workers, he said, had been warned they would lose their jobs if they associated themselves with the revolt.

In announcing the new group, Davey accused Lewis of clinging to the isolationist policies he espoused before Pearl Harbor, and of fighting the war production program advanced by CIO President Philip Murray.

Army Sends Truck Through Picket Line

A piece of machinery needed at once for war production was brought out of the strike-bound Beckwith Machinery Co., Pittsburgh, last week in a truck protected by soldiers. The Army ordnance unit in Meadville, Pa., resorted to this expedient when AFL machnists, striking for $1.25, disputed the claim of Dr. John Steelman, chief of the United States Conciliation Service, that the plant was producing vital equipment.

War Factories To Require 10,500,000 More in 1942

Factories producing war materials will require 10,500,000 more workers this year according to John J. Corson, director, United States Employment Service.

Mr. Corson estimated the country's labor force at the end of 1942 would be 58,200,000 persons, including 4,200,000 in the armed forces, 52,000,000 employed, and 2,000,000 unemployed. Of the employed, 8,000,000 would be farm workers, 26,500,000 employed in civilian industries, and 17,500,000 in war work.

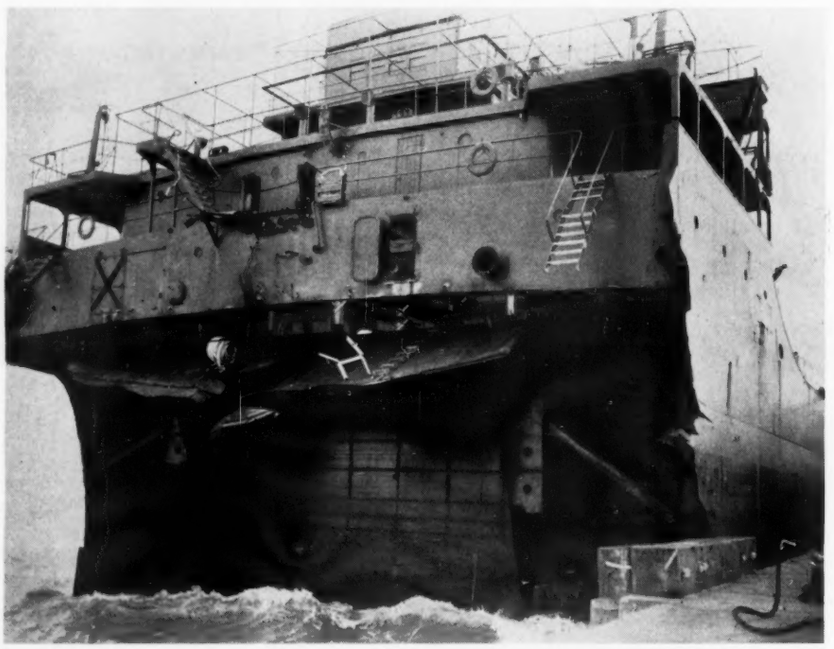
Union's Wage Demand Exceeds CIO Request

Exceeding by 25 cents the $1 a day wage increase asked of "Little Steel" companies by the CIO, an independent union of Weirton employes of the National Steel Corp., demanded $1.25 additional daily pay, *The Weirton Worker*, union paper, reported last week. The CIO demand still is under review by the War Labor Board.

Electrical Workers Ask For Raise and "Benefits"

In negotiations with the General Electric Co., Schenectady, and Westinghouse Electric & Mfg. Co., Pittsburgh, the United Electrical, Radio and Machine Workers of America last week demanded a general wage increase of 12½ cents an hour, improved benefits for workers entering the country's armed services, and other union security clauses.

Torpedoed Tanker To See Service Again



ALTHOUGH badly damaged by either a mine or torpedo off the Atlantic coast, the 11,600-ton tanker E. H. BLUM of American registry can be returned to service. After being damaged the ship rested in shallow water. A salvage crew cut off the forward part and towed it to Norfolk, Va., where a new stern will be attached. Here is shown the forward part of the vessel at a Norfolk dock. NEA photo

REVISIONS AND ADDITIONS TO

PRIORITIES—ALLOCATIONS PRICES

as published in Section Two of STEEL of Feb. 23, 1942

"M" ORDERS

M-1-g: Aluminum Pigment, effective March 10, 1942. Prohibits manufacture or acquisition of aluminum pigment or paint except as authorized by Director of Industry Operations. Does not apply to normal over-the-counter retail sales to general public. PD-312 used to apply for authorization. Pigment manufacturers and paint formulators and jobbers must file PD-313 by 15th of April and each month thereafter to report stocks.

M-76: Turbines, effective March 9, 1942. Enables Director of Industry Operations to establish production schedules for orders already placed for production of land turbines and to prevent their displacement by an order subsequently placed.

M-83: Teak, effective March 5, 1942. Restricts use to Army and Navy.

M-87: Olive Drap Wool Clips, Rags, Wastes, effective March 10, 1942. Restricts sale and use of such material to manufacture of garments for armed forces.

M-101: Mica, effective March 6, 1942. Prohibits processing of block mica of quality better than heavy-stained, except for government and Lend-Lease orders. Processors report to WPB on PD-325.

M-107: Cotton Bags, effective March 10, 1942. Assigns A-2 rating to cotton fabrics for manufacture of cotton bags for agricultural and chemical products.

"P" ORDERS

P-39 (Extension): **Welding Machines,** issued March 9, 1942. Order extended to May 1, 1942. After latter date priority assistances obtainable under Production Requirements Plan.

P-40 (Extension): **Industrial Lift Trucks,** issued March 7, 1942. Extends order to May 10, 1942. After this date, preference ratings must be obtained through Production Requirements Plan (P-90).

P-47 (Amendment): **Air Transportation Facilities,** effective March 6, 1942. Raises former A-3 preference rating to A-1-j for deliveries of materials and equipment used by commercial airlines for maintenance and operation.

P-54 (Extension): **Trucks, Trailers, Buses,** effective March 6, 1942. Extends A-3 rating to April 30, 1942 for deliveries of materials going into truck trailers and buses. Does not apply to materials for manufacture of complete trucks or truck chassis. After April 30, manufacturers must apply for ratings through Production Requirements Plan (P-90).

P-79 (Revised): **Non-metal Containers,** effective March 11, 1942. Raises from A-8 to A-7 the rating applicable to deliveries of steel wire used in manufacture of cooperage and wooden and paper board containers. Other ferrous materials, as originally, take A-5 rating. Co-operatives may apply ratings for materials to be distributed among members.

P-100 (Amendment): **Repairs, Maintenance, Operating Supplies,** effective March 9, 1942. Assigns A-10 rating to materials for repair and maintenance of refrigerating equipment in stores and restaurants.

P-107 (Amendment): **Parts for Trucks, Trailers, Buses,** effective March 6, 1942. Raises former A-3 preference rating to A-2 for deliveries of materials used in manufacture of replacement parts. Producers must file PD-25A by June 1 for rating to be effective on deliveries after June 30, 1942.

P-122: Aircraft, effective March 9, 1942. Raises to A-1-a or A-1-b all ratings assigned by any previously issued preference rating certificates PD-1, PD-1A, PD-3, PD-3A or PD-5 for military and naval aircraft. A-1-a applies to tactical planes, A-1-b to trainers.

"L" ORDERS

L-2-i: Inventories of Automotive Manufacturers, effective March 9, 1942. Prohibits automotive companies from selling alloy steel from inventory except on orders of A-1-k or higher rating, all other steel on A-3 or higher rating. Sales must be certified to Distressed Stocks Unit, Iron & Steel Branch, WPB.

L-7-a (Amendment): **Domestic Ice Refrigerators,** effective March 6, 1942. Provides that steel quota used in manufacturing apply to entire first quarter of 1942 instead of to each month separately.

L-26-a: Farm Tractor Tires, effective March 9, 1942. Limits March output of farm tractors requiring rubber tires to 55% of monthly average production in January-February, 1942. April output limited to 40% of base. After May 1, 1942, production of any such tractors banned.

L-35 (Amendment): **Spare Parts for Trucks, Trailers and Buses,** effective March 5, 1942. Permits manufacturers to make from Jan. 1 to June 30, 1942 up to 75% of number of spare parts sold for that purpose in 1941; from Jan. 1 to Sept. 30, 1942 up to 112½% of 1941 total; for all of 1942 up to 150% of 1941.

L-42 (Addition): **Plumbing and Heating Products,** issued March 7, 1942. Schedule III eliminates metal jackets, fusible plugs and tri-cocks from low-pressure heating boilers after June 1, 1942, unless completed units were on hand on that date. Stops production of metal jackets March 16, 1942.

L-44-a: Radio Receivers and Phonographs, effective March 7, 1942. Prohibits production of these units after April 22, 1940. Bans use of more than $500 worth of materials, except wooden cabinets, obtained through orders placed after Feb. 11, 1942. Manufacture of replacement parts not affected.

L-54: Typewriters, effective March 6, 1942. Prohibits delivery of new and used units, except for repairs, pending institution of rationing by OPA.

L-58: Sextants, effective March 11, 1942. Prohibits sales except to government agencies, to buyers who have obtained a certificate from the Coast Guard, and to dealers. Imports from Great Britain prohibited unless approved by Lend-Lease Administration.

L-61: Rubber Machinery, effective March 11, 1942. Prohibits manufacture or sale of equipment used to retread or recap rubber tires except on orders rated by Director of Industry Operations on PD-1A. Does not apply to repair parts.

MISCELLANEOUS ORDERS

Priorities Regulation No. 1 (Interpretation), effective March 9, 1942. Permits seasonal industries to build up their inventories in anticipation of peak requirements, provided they refrain from hoarding and from accumulating larger inventories than those acquired usually for the period in question.

PRICE SCHEDULES

No. 100 (Amendment): **Cast Iron Soil Pipe,** effective March 7, 1942. Permits warehouses handling this product to compute delivery charges from warehouses in accordance with methods employed on Oct. 1, 1941.

No. 107: Used Tire and Tubes, effective March 16, 1942. Establishes maximum retail prices varying with amount of remaining tread. Typical prices 4-ply passenger 6.00 x 16, $1.50 to $8.10; 6.50 x 16, $1.50 to $9.85; 10-ply truck 8.25 x 15, $7.20 to $37.70; 9.00 x 18, $12 to $42.95.

Suspension Orders Issued Against Two Chicago Firms

Two aluminum scrap users in Chicago have been barred from either receiving or delivering, processing, or otherwise dealing in aluminum or aluminum scrap for the next two months under suspension orders issued last week by WPB.

Companies named were the National Parts Corp. and the Atlas Brass & Aluminum Foundry. They were accused by WPB of dealing in aluminum without preference ratings.

For additional revisions and additions please see STEEL of March 2, p. 39, and STEEL of March 9, p. 38.

Windows of *WASHINGTON*

President reported in favor of freezing certain wages as anti-inflation measure . . . Deliveries of new and used typewriters halted . . . Land turbine production placed under WPB control . . . Scrap dealers reminded of restrictions on solder manufacture . . . Production of unapproved gas masks banned . . . Extension of preference ratings by building contractors simplified . . . Price schedule for cast iron soil pipe amended

By L. M. LAMM
Washington Editor, STEEL

WASHINGTON

CONGRESSIONAL circles are discussing reports that President Roosevelt is considering favorably the freezing of certain wages in an effort to forestall inflation.

Whether the President's attitude will manifest itself in legislative recommendations or action by the War Production Board and War Labor Board is uncertain. However, it is reported in responsible quarters that Mr. Roosevelt's attitude is that wages, especially skilled wages, are now high enough and that any further increases merely mean higher prices which in turn would mean more wage demands.

It is said here that the President on Monday of last week discussed the idea of putting a ceiling on wages of skilled workers with his congressional leaders. Significance also is attached to the fact that on the same day Mr. Roosevelt confided his anti-inflation policy to his congressional leaders he had Leon Henderson, OPA price administrator, for a luncheon guest.

Henderson is reported as having told the President something had to be done about wage increases, that the administration must have a wage policy which would declare firmly against further rises in wages of skilled workers if inflation were to be staved off.

It is pointed out that for some weeks Mr. Henderson has been demanding an administration wage policy. Some time ago he argued for such before the War Labor Board, and he suggested in a recent speech that wage increases be banned except in those brackets which are at the bottom of the wage scale.

Henderson is said to be skeptical of letting a wage policy evolve through a series of decisions by the War Labor Board lest the pressure of organized lobar on the board and at the White House cause the evolution to go the wrong way. However, until his luncheon with the President this week, it is said Mr. Henderson has not urged his point of view personally on Mr. Roosevelt.

Observers here point out that on the day Mr. Henderson lunched with the President, the latter later spoke over the radio about inflation, in which address he urged that nobody take advantage of the war situation and warned of the evils of uncontrolled price rises but he did not specifically demand a halt of either farm prices or wages.

Typewriter Deliveries Prohibited by WPB

War Production Board has stopped all deliveries of both new and used typewriters, effective immediately. Orders for rationing typewriters is now in preparation and will be announced shortly, WPB said.

Typewriters may be delivered from one dealer or distributor to another but not from manufacturer to dealer or distributor.

Production Board Lists Relative Scarcity of Metals

Virtually all major metals are listed by WPB in first of a series of periodic reports on the relative scarcity of various materials among those not generally available for civilian use and for which substitutions are necessary.

The report covers three general groups. Under Group 1, headed "Materials Most Vitally Needed for War Purposes Not Generally Available for Civilian Needs," were listed alloy iron and alloy steel, wrought iron, virgin and scrap aluminum, cadmium, calcium-silicon, chromium, iridium, lead, magnesium, nickel, tin, tin plate, terne plate, tungsten, cobalt, copper and copper scrap and vanadium.

Under the heading "War Materials Presently Available for Substitution in Critical Civilian Industry" were listed basic low-carbon steel, bessemer steel, gray cast iron and malleable iron.

Right of WPB Agents To Inspect Company's Books Upheld

Authority of WPB agents to have access to the premises and records of a company affected by priority orders has been upheld by Federal Judge John P. Barnes, Chicago, who recently issued a permanent injunction requiring the Chicago Alloy Products Co. to permit audit and inspection by government agents and to refrain from disposing of its stock of metals until the audit had been made.

The action was a consent decree.

Request for the injunction, first action of its kind taken by the government, followed, according to a WPB statement, the refusal of the company to permit inspection by government agents. Attorneys for the company denied such permission had been refused.

Land Turbine Production Under War Board's Control

The orderly production of land turbines needed for the generation of electric power for war industries is provided for in Order M-76 issued by WPB.

The three major producers of land turbines are Westinghouse Electric & Mfg. Co., General Electric Co., and Allis-Chalmers Mfg. Co. The effect of the order is to enable the director of industry operations to establish production schedules for orders already placed with producers of these turbines and to prevent their displacement by a purchase order subsequently placed.

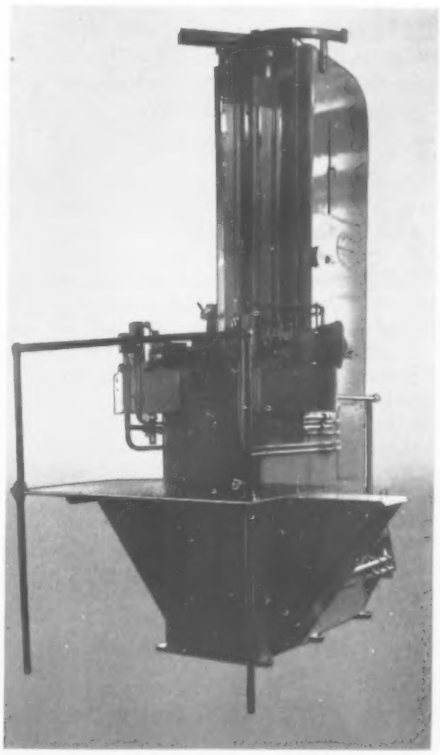
Such prohibitions do not apply, of course, to turbines that might be more urgently needed than orders already on the books. In such cases,

AMERICAN
HELPS POWER
Allied Convoys

The AMERICAN SB-66-15-2 single dual surface broaching machine shown to right and below, is arranged for broaching Marine Diesel Connecting Rods and Caps. These parts are broached with locking keys in the Rod and mating keyway in the Cap. Also all joint face surfaces are finish broached simultaneously.

The broach holder carries tooling set up on one side for Rod broaching and on the opposite side for Cap broaching. While machine is making a cutting stroke on rod held in left fixture (see cut, left, below) operator is loading right fixture with Rod Cap, this fixture being in "out" position. When machine is ready for next stroke the left fixture recedes to "out" or loading position and right fixture advances to broaching position. Process is then repeated broaching Rod Cap on right fixture and loading a new Rod in left fixture (see cut, right, below).

Production of 85 pieces each of Rod and Cap per hour are obtained at 100% efficiency.



AMERICAN BROACH & MACHINE COMPANY
ANN ARBOR, MICHIGAN, U. S. A.
BROACHING MACHINES, PRESSES, BROACHING TOOLS, SPECIAL MACHINERY

Division of SUNDSTRAND MACHINE TOOL CO. ROCKFORD, ILLINOIS, U.S.A.

the director of industry operations may authorize a change which will give a higher standing in the delivery schedule to any turbine more urgently needed.

Manufacture of Unapproved Gas Masks Prohibited

Manufacture or sale of gas masks and antigas devices for protection against enemy attack has been banned by the WPB, unless the masks and devices are actually on order by agencies of the government, including the OCD, and are built to Army chemical warfare service specifications.

Limitation Order L-57, issued after consultation with the Chemical Warfare Service and the OCD, is designed to halt a fast-growing sale of unapproved gas masks to the civilian population, and to effect the most complete standardization possible.

The order also prohibits the delivery or sale of any laminated cloth, laminated glass or plastic lenses, metal buckles or buttons, primary or activated charcoal, rubber, synthetic rubber, webbing, or duck for use in unapproved masks.

Masks manufactured for fire-fighting, mining, industrial, scientific and similar non-military purposes are not affected by the order, provided they are advertised and sold for such purposes.

Rating for Lift Truck Materials Extended to May 10

Extension until May 10 of Preference Rating Order P-40, making available an A-1-g rating for materials going into the manufacture of industrial lift trucks and replacement parts has been announced by WPB.

Manufacturers of these trucks are expected soon to file material requirements under the Production Requirements Plan, and the extension of the A-1-g rating is designed to enable them to continue to get materials pending the transition to PRP.

WPB advised manufacturers that Order P-40 will in no event be extended beyond May 10.

Scrap Dealers Warned on Manufacture of Solder

Scrap dealers who were not engaged in the manufacture of solder in the first quarter of 1940 and are now offering solder for sale are doing so in direct violation of Conservation Order M-43-a, WPB warned last week.

The order specifically provides that all consumers of tin shall be limited to a percentage of the amount they used in the corresponding quarter of 1940. Those who were not engaged in the manufacture of solder at that time, therefore, could not engage in the business now, except by specific authorization.

Builders' Rating Extension Facilitated by New Form

Extension of preference ratings by building contractors will be facilitated by a new form of order, P-19-h, which will be used in most cases hereafter to assign ratings to construction projects in response to applications on forms PD-200 and PD-200A.

The new form of order will permit application of ratings by builders by a simple endorsement on purchase orders, containing the serial number issued for the project. A similar form of endorsement may be used for extension of ratings on orders served on the builders' suppliers, except that before extending a rating a supplier must execute and forward to the WPB a special form of acceptance. Only one filing of the acceptance is necessary, after which the supplier may extend any rating assigned by Order P-19-h, regardless of serial number.

Reference to the Priorities Critical List has been eliminated from the order, but use of the assigned rating has been more strictly limited to materials which will be physically incorporated in the rated project.

Suppliers to whom ratings are extended under the new order may accumulate the ratings up to a period of three months until they can place an order for a minimum commercial quantity of the rated material if they do not process it in any way, and, subject to the same restrictions, suppliers may "basket" or accumulate ratings on orders from two or more contractors.

Cast Iron Soil Pipe and Fittings Price Schedule Amended

Permission for warehouse operators handling cast iron soil pipe and fittings to compute delivery charges from warehouses in accordance with methods employed on Oct. 1, 1941 is granted in Amendment No. 1 to Revised Price Schedule No. 100 (Cast Iron Soil Pipe and Fittings), by OPA. Amendment became effective March 7.

Prior to the amendment, the price schedule established as maximum delivered prices for shipment to a purchaser from a point other than a foundry, the maximum f.o.b. Birmingham, Ala., price plus a transportation charge at the railroad carload freight rate from Birmingham to the place where the shipment originates.

Inquiry by OPA later revealed that before the effective date of the schedule some warehouse operators either sold this product f.o.b. the warehouse and made a further charge for delivery from warehouse stocks, or recognized a free delivery zone or zones and made a further charge for delivery outside these zones.

The amendment merely changes the wording to indicate clearly that in arriving at a delivered price for shipments originating at the foundry, transportation charges are to be computed at the carload rate, rather than at the total carload charge. This clarification preserves a well established industry practice.

Amendment also provides—to enable OPA to determine when warehouse operators make delivery charges which exceed those allowed by the amended section—that manufacturers, jobbers and wholesalers who sell pipe other than for shipment from a foundry are required to file with OPA a notarized document stating that no free zone was recognized by the seller on Oct. 1, 1941, or describing the zone or zones on that date.

Simplified Practice Submitted To Air Heating Industry

The elimination of over 4500 kinds and sizes of pipes, ducts, and fittings, for warm air heating and air conditioning is proposed in a simplification program submitted last week to industry by the Division of Simplified Practice, National Bureau of Standards, at the request of the War Production Board.

The program, which sets up what is believed to be an entirely adequate range of fittings, lists only about 15 per cent of the gravity type furnace pipe and fittings, and only 19 per cent of the ducts and fittings for forced air heating and air conditioning currently offered. A substantial reduction is also proposed in the registers and faces with which those fittings connect. The War Production Board initiated the proposal with a view to conserving sheet metal, reducing inventories of slow moving stocks, and releasing production facilities for war purposes. Manufacturers of these products are being requested to review the program, which, if found technically satisfactory, may become the basis for a limitation order.

Any manufacturers who have not already received a copy of the proposed recommendation, are urged to communicate immediately with the Division of Simplified Practice, National Bureau of Standards, Washington, stating what tonnage of metal they normally consume per annum in the production of these goods.

Nelson Says: "Production Can Be Doubled with Present Facilities"

WASHINGTON

PRODUCTION of military supplies can be doubled if all the facilities now available were utilized 24 hours a day, seven days a week, Donald M. Nelson declared in a radio broadcast last Tuesday night, his second within ten days.

He warned that unless production is brought to "victorious levels" neither management nor labor "could survive the public wrath should that wrath be turned against them," nor could the War Production Board.

He mentioned two ways of arriving at the necessary production level: The American way; and the way of bondage, of force.

"If we are to achieve victory for the ideals we free men have always loved," he said, "then we on the production lines must abandon every other consideration except increasing production and increasing it every day."

He further declared that, "When I say we can increase production substantially by greater use of existing machinery, I am thinking of the 20 per cent of war plants operating only 5 or 5½ days per week. In am thinking of the many plants closed Sundays. I have in mind the second shifts using only 40 per cent of plant capacity and the third shifts using only 20 per cent."

He pointed out two industries as having considerable unused facilities, the 31 aircraft engine and propeller plants, and the 153 plants manufacturing machine tools. Nelson said if all facilities of the aircraft engine and propeller plants were utilized to the same extent as the three with the best records, the total output of the industry could be boosted 25 per cent. And, he estimated, if all 153 machine tool plants were operating at the same utilization level as the best three, machine tool output could be increased 45 per cent immediately.

He stated the production drive which he launched in the preceding week was one step in the WPB's effort to boost armament production, and that the next was the integration of the army, navy and maritime commission procurement setups into a "hard-hitting . . . unified supply system."

This was the first official disclosure that such a procurement combination was in the making, although it had been learned earlier that Douglas C. Mackeachie, WPB purchasing director, was being transferred to the War department where presumably he will exercise considerable authority over military procurement policies.

Green and Murray Talk It Over with Nelson

MEETING with Donald M. Nelson last week, William Green, A.F. of L. president (left) and Philip Murray, CIO president (right), assured him of "full co-operation" by their respective organizations. To newsmen Murray reiterated his "no strike" pledge. Later, in a speech in New York, he denied that CIO's wage-raising efforts are unpatriotic, and bitterly assailed "silly statesmen" and "agents of the federal government". NEA photo

Calls for Monthly Progress Reports By Manufacturers

AMERICAN industry was ordered last week by Donald M. Nelson to begin sending the War Production Board a month-by-month report on its conversion to war work.

In a letter to manufacturers Mr. Nelson enclosed the first three-page form to be filled out and returned for tabulation by March 25. Similar forms will be returned by manufacturers each month.

The report will give a general over-all picture of the war and civilian work currently being done, and plans for future utilization of facilities.

Plants will list the principal classes of products produced during the previous month, indicating whether it is war or civilian work. These data will include the total value of shipments during the previous month, value of unfilled orders at the end of the month, and the estimated man hours worked by wage earners during the previous month. Shipments will be classed as war work (prime contracts and orders with AA to A-1 preference ratings) or other work.

The report will give the schedule for peak operations on war work including the expected month of peak employment and the value of war work shipments, the estimated total man hours and the estimated total wage earners in the peak month.

Another section of the report will give the total number of machine tools in place in the plant and the estimated number of hours the machines worked during a specified week of the previous month. Space will be provided in the report for listing tools that want additional war work. Plants will list the number of wage earners employed during a specified week, classifying them as male or female and as productive or nonproductive employes.

Agreements With OPA Permitted by Price Control Act, Says Henderson

WASHINGTON

ANY danger that agreements made by industry members with the OPA pursuant to the Emergency Price Control Act of 1842 would violate anti-trust laws is removed by the terms of the act, Price Administrator Leon Henderson stated last week in response to queries raised recently.

"Such agreements are now authorized by act of Congress," Mr. Henderson said. "The Emergency Price Control Act of 1942, in Section 5, specifically provides that '. . . the administrator is authorized . . . to enter into voluntary arrangements or agreements with any . . . persons, groups, or associations relating to the fixing of maximum prices, the issuance of other regulations or orders, or the other purposes of this act . . .'

"The Office of Price Administration may thus proceed, under its own power, to complete agreements which will prevent undue price increases. Formerly we had acted on accordance with letters from the Attorney General granting permission to make such agreements. Under the new statutory procedure the Attorney General is furnished with a copy of the agreement after it has been entered into. While we shall continue to work in close collaboration with the Department of Justice, the protection afforded to our voluntary agreements with industry is now statutory."

Mr. Henderson further emphasized that the OPA will continue to rely upon such voluntary agreements since the wholehearted cooperation of industry has been and will be an important aid toward the type of price control essential to our war effort.

New Consultants Named for Defense Transportation Unit

Philip A. Hollar has been made acting director, Section of Materials and Equipment, Office of Defense Transportation, succeeding Col. Charles D. Young. Colonel Young, a reserve officer in the Army, has been called to active duty.

Eight consultants have been appointed to advise Mr. Hollar on technical matters pertaining to materials and equipment for various branches of the transportation industry.

At the time of his appointment, Mr. Hollar was a member of the staff of the Association of American Railroads, serving as a special representative of the operations and maintenance department.

Newly appointed consultants, and fields to which they have been assigned, are:

F. H. Hardin—Railroad freight, passenger, and all other types of cars. Mr. Hardin is president of the Association of Manufacturers of Chilled Car Wheels, New York.

Jerome G. Bower—Castings and miscellaneous items required in rail transportation manufacture and maintenance. Mr. Bower was formerly eastern representative of the Buckeye Steel Castings Co., with offices in New York.

Charles T. Ripley—Steam, diesel, and electric locomotives. Mr. Ripley is chief engineer of the technical board of the Wrought Steel Wheel Industry, Chicago.

H. L. Hamilton—Diesel engines for railroad propulsion equipment. Mr. Hamilton is manager of the Electro-Motive Division of General Motors Corp., La Grange, Ill.

Irving B. Babcock—Buses, trucks, taxicabs, and replacement parts. Mr. Babcock is president and general manager of General Motors Truck Corp., Pontiac, Mich.

Harold C. Davis — Equipment and supplies for maintenance of buses and trucks. Mr. Davis is vice president of Consolidated Motor Lines Inc., with headquarters in New York City and Hartford, Conn.

Robert F. Black—Equipment on which production has been suspended, including buses, trucks, fire-fighting apparatus, road work equipment, and work equipment for public utilities and communications companies. Mr. Black is president of the White Motor Co., Cleveland.

A. L. Viles—Rubber products, including tires, tubes, insulated wire, and belting and other mechanical rubber goods. Mr. Viles is president of the Rubber Manufacturers Association Inc., New York City, and chairman of the buying committee of the RFC Rubber Reserve Co.

Carroll W. Brown has been appointed Assistant to the Director of the Section of Materials and Equipment. From 1933 to 1936 Mr. Brown served on the staff of the Federal Coordinator of Transportation as Assistant Director of the Section of Property and Equipment. Until recently he had been employed as an equipment engineer on construction work at the Ravenna, O., ordnance plant.

Driving First Rivet in Battleship's Keel

FIRST rivet is driven into the keel of the U. S. S. KENTUCKY, 45,000-ton battleship laid down at the Norfolk, Va., Navy yard, by Rear Admiral Felix X. Gyrax, right, the yard's commandant. At left is Commander W. M. Hague, construction superintendent. The keel was laid recently without the usual ceremonies. NEA photo

War Orders Must Be Filled According To Priority Ratings, Adams Rules

WASHINGTON

WAR orders for steel must be produced in proper sequence of preference rating regardless of the product involved, presidents of the nation's steel companies were informed last week by C. E. Adams, chief, WPB Iron and Steel Branch.

He quoted paragraphs (b) (4) and (b) (10) of General Preference Order M-21.

In a letter to producers, Mr. Adams said:

"In order that there may be no misinterpretation of these paragraphs, it must be definitely understood that defense orders must be produced and shipped in proper sequence of preference ratings, regardless of the products involved; for example, a sheet or pipe order bearing a lower rating must not be produced before a higher-rated bar or plate order requiring the same delivery, unless the bar and plate mills in question are operating at the greatest possible capacity.

"To accomplish this in the interest of the war effort, it is necessary to apply the preference rating system, beginning with the ingot production of each producer and see that it is followed strictly in all subsequent operations, in the absence of contrary instructions from the director of industry operations. In other words, your finishing mills carrying high preference ratings must be provided with steel to insure maximum operation, regardless of the fact that you may not then be able to assign steel for the production of lower-rated products."

WPB Provides for Sale of Automakers' Surplus Steel

Sheet and strip steel, hot and cold-rolled bars and other types of steel widely in demand in war manufacturing industries may be sold by the automotive industry to persons possessing high preference ratings, WPB has ruled.

Since passenger car production was halted Feb. 1, manufacturers have been left with sizable inventories of various steel products.

In order to prevent this large reservoir of steel from flowing into non-essential production, WPB ruled that automotive companies may sell alloy steel, including stainless, only to persons possessing an A-1-k or higher preference rating, and all other steel only to persons having an A-3 or higher rating.

Sales also may be made to the Defense Supplies Corp., the Metals Reserve Co., or any other corporation organized under the Reconstruction Finance Corp., or by specific consent of the WPB director of industry operations.

Sales made to preference rating bearers must be certified to the Distressed Stocks Unit of the WPB Iron and Steel Branch.

It is expected a large proportion of the stocks now on hand can be disposed of under high-rated preference orders. The Automotive Branch of WPB will make an inventory study during the next few weeks and, if excessive stocks are still on hand at that time, adjustments in the selling plan will be made.

Steel Warehouse Group Meets With WPB Officials

Maintenance of adequate steel supply in all areas of the country, and other problems of the industry were considered at a meeting of the general Steel Warehouse Advisory subcommittee with C. E. Adams, chief, iron, steel branch, WPB, last week.

Following introductory presentation of Adams, a general statement of the objectives and problems of the industry was made by J. R. Stuart, head of the warehouse unit, iron, steel branch.

General problems discussed include maintenance, adequate steel supply, Pacific coast, south, and war production areas, besides other sections of the nation; quotas on schedule A products including tubing, tool steel, related products; earmarked stocks of aircraft steel, ship repair needs; disposition of frozen stocks, and whether any additional control is needed. Also carload orders in relation to M-21-b and other orders or price schedules.

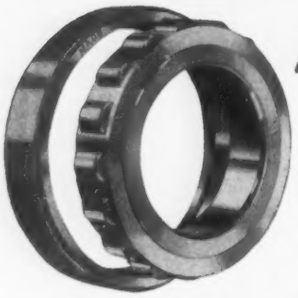
James Cooley, counsel, iron and steel branch, presented legal aspects of current industry problems.

Among those present were; Guy P. Bible, Horace T. Potts Co., Philadelphia; C. H. Bardley, Holliday & Co., Indianapolis; Lester A. Brion, Peter A. Frasse & Co., New York; A. C. Castle, Castle & Co., Chicago; W. S. Doxsey, American Steel Warehouse Association, Cleveland; Sol. Friedman, Reliance Steel Corp., Cleveland; Everett D. Graff, Joseph T. Ryerson & Sons, Chicago; Earl M. Jorgensen, Jorgensen Co., Los Angeles; W. Kurtz, Peninsular Steel Co., Cleveland; Richard Lewis, Charles C. Lewis Co., Springfield, Mass.; J. H. Peebles, Peden Iron & Steel Co., Houston, Tex.

New Tank Has Streamlined All-Cast Body

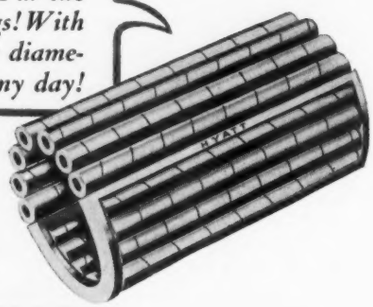
NEW "all-cast," rivetless, M-4 medium tank at the right will be ready shortly for tests at Ft. Knox, Ky. This 30-ton unit is lower and more streamlined than its riveted steel-plate counterpart, M-3, at the left. Installation of 4000-pound steel turret castings on medium tanks was begun late last year. Armament will include a 75 mm. cannon, and machine guns. NEA photo

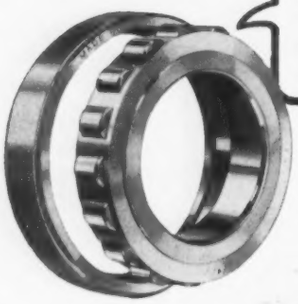
Said 1942 to 1892



1942: *Hi, Old Timer!*

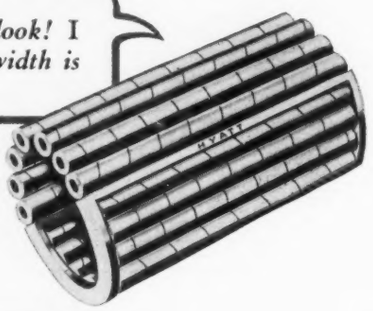
1892: *A little more respect, please. I'm the daddy of our great line of Hyatt Bearings! With a tolerance of .010 in my wound roller diameters I was the Number One bearing of my day!*

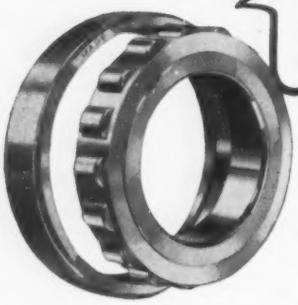




1942: *Okay Dad, but with my modern design and close tolerance of one ten-thousandth of an inch, I'm the "fair-haired boy" today.*

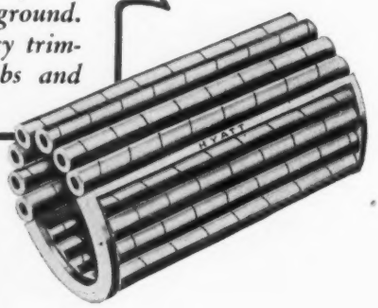
1892: *Hmph! But how skinny you look! I had a width of 6-7 inches while your width is only 1-1½ inches, young fellow.*

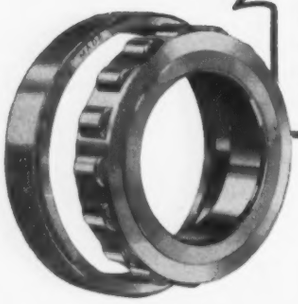




1942: *I'm streamlined, old man, but what capacity I possess. And I'm a pretty slick article with my inner and outer race, and my ultra finish.*

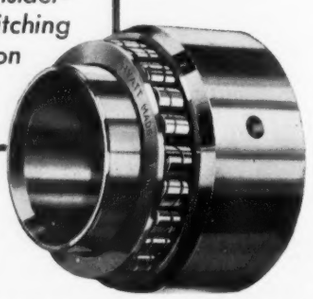
1892: *I know . . . I've watched you develop over fifty years. Sure I was made of only low carbon steel and my finish wasn't even ground. In my day, we didn't have all the fancy trimmings—but we handled the tough jobs and handled them well!*





1942: *I appreciate all that, old fellow, but think how out-of-place you would be today with that crude half-spacer roller retainment as compared to my swanky bronze cage and microscopically finished solid rollers and races.*

1892-1942: *You're right, lad. But look me over now. Other than in roller design I've changed considerably during these years. And I'm still in there pitching with you where applications call for my lubrication features and shock load advantages. So—give credit where credit is due!*



THE 50TH YEAR OF

HYATT ROLLER BEARINGS

HYATT BEARINGS DIVISION, GENERAL MOTORS CORPORATION, HARRISON, NEW JERSEY

Mirrors of *MOTORDOM*

Union presses for action on Nelson's management-labor committees, at the same time condemning plan to reward production-speeding ideas with defense stamps and bonds. Under new scheme, single idea may be worth $1000 award . . . WLB forward passes overtime dispute back to industry . . . Steel company plans cupolas to supply hot metal for electric furnaces . . . Investigate dephosphorizing methods

By A. H. ALLEN
Detroit Editor, STEEL

DETROIT

DONALD M. NELSON's plan for setting up joint management-labor committees to expedite production in war plants may have reopened what was considered a dead-issue—the Murray plan for government-labor-management committees to run the production effort. Already the UAW-CIO, through a letter to C. E. Wilson, president of General Motors, has requested a conference at the "earliest possible date" to organize these new joint committees in GM plants.

Despite the surface similarity between the old Murray industrial council idea and the present Nelson plan, it is not likely the committees now being organized were intended in any sense to take over the planning or direction of production. Rather they will be more concerned with psychological methods of bringing home to workmen the importance of intensive production efforts.

However, an official enumeration of the functions of the committees includes the subject of "studying plant efficiency" which would cover such phases as caring for tools, preventing breakdowns, reducing accidents, improving lighting, cutting wastage, adapting old machines to new uses, etc. Most of these things are watched closely by maintenance and repair departments, and if the new committees are to spend their time bickering with departments now functioning regularly, their time will have been wasted.

GM Award Plan

There are some who do not side in at all with "committees" for anything, although it must be granted that little can be done in this country without first organizing a committee to handle it. These nonconformists think the best way to get production into high gear is simply to buckle down to the job and forget about the stage settings, fireworks, scoreboards, pep talks and "committees". It is too often true that the best way to get an argument started is to organize a committee; as many different viewpoints will develop as there are individuals on the committee.

Stealing a march on the production-stimulating committees which have yet to materialize, General Motors announced last week a plan for rewarding employes in defense bonds and stamps for suggestions leading to increasing production, improving quality, saving material, reducing waste or improving working conditions. As much as $1000 can be earned from a single suggestion.

Already in effect, the plan calls for employes to place suggestions in convenient boxes at various plants, the suggestions to be reviewed once a week by a committee of three, four or five men appointed by the plant manager from the engineering or drafting, personnel, time study, accounting or processing departments. Awards will fall in three classifications:

1. Those which relate to the employe's own job and which result in increased production above standards established for the job when the suggestion was made. In such cases, the award will be equal to the value of the increased production, figured in hours saved and at the employe's earned rate, over the succeeding two months' period.

2. Those which relate both to the employe's own job and the work of others on duplicate operations or on other shifts. In such case, the award will be the same as above, plus savings effected on other jobs for a one-month period, the maximum award to be not over $750 or the cost of a $1000 face-value bond. An additional one-month savings may be divided among other employes in a manner to be determined by the Suggestion Committee.

3. Those which relate to improving quality of production, safety conditions or other factors not directly measurable. Awards here will range from $7.50 in defense stamps to a $25 bond, according to determination of the committee.

Naturally all employes who in the course of their work are expected to do creative thinking will not be eligible for awards. This includes men in the engineering, processing, tool design, production planning and all foremen and supervisory employes.

Objections Conform to Basic Union Philosophy

The UAW-CIO immediately claimed the award plan was an insidious attempt to vitiate the effectiveness of the forthcoming management-labor committees and no doubt will ask its members to refrain from making suggestions. But it has been demonstrated for a good many years that the best way to obtain ideas for improving production is to pay for them, so the GM plan should prove an effective stimulant, one which should logically be copied widely.

The union's objections to any such incentive system were to be expected, because since the inception of unions in the automotive industry it has been their policy to condemn such things as incentive systems, bonus systems, piecework rates and the like because of their basic belief in leveling off the plane of work in all plants to that of the least efficient workman. Rewards for individual initiative and exceptional effort have gone against their grain. It is not inconceivable that as the needle is given to the war production effort over the coming months, there will be instances of unions claiming their men are being broken physically by "inhuman speedups".

The political power of unions is a thing to be reckoned with. It has

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grown to a point where Washington and the President himself are either afraid of or find it politically expedient to acquiesce to union demands. Witness the following item from the latest issue of the *United Automobile Worker:*

"Charles F. Palmer, defense housing co-ordinator, has been sent to England by President Roosevelt. He was dismissed from his key housing post by President Roosevelt following demands by Pres. R. J. Thomas of the UAW-CIO.

"Thomas launched the anti-Palmer drive about six weeks ago. He charged that the Ford and other defense workers were getting nowhere with their housing problems because Palmer was conniving with the real estate people.

"Thomas therefore brought the matter to a head during a visit to President Roosevelt, when he urged that Palmer be ousted.

" 'We helped to give Palmer his passport to England,' Thomas declared when word came from the White House that Palmer had been 'liquidated'."

Dispute over paying double time for Sunday work when part of a 40-hour week, which was considered to be so vital to future policies that it was referred to the War Labor Board by General Motors and the UAW-CIO, was tossed right back in their laps by the board, apparently being too hot a potato for it to handle. This action was silent testimony to the lack of any national direction in labor matters, ir spite of the three or four different boards which have been set up in Washington to make decisions on such problems.

Cupolas and Bessemers Aid Steelmaking Capacity

A steel company in this area, operating basic-lined electric furnaces and running into increasing difficulty in obtaining sufficient quantities of scrap for melting, is giving serious consideration to the installation of a cupola to furnish hot metal for the electric furnaces instead of charging cold scrap. The cupola would be charged with both scrap and pig iron and would serve to reduce sharply the amount of electric current consumed in the melt-down period of the electric furnaces. Thus a cupola at once would ease the scrap problem somewhat and lower power costs for electric melting. It is interesting to note that this mill is finding phosphorus content of its heats before refining running up as high as 0.40 per cent, as a direct result of the lower grades of scrap.

The phosphorus problem is one which is become increasing important in this area, especially to companies considering production of steel for castings by combining the economy of the cupola with the speed of the bessemer. It is not possible to eliminate phosphorus until manganese and silicon contents have been brought down to around 0.20 per cent, and this is done quickly in the acid bessemer furnace, but the problem of phosphorus and sulphur remains.

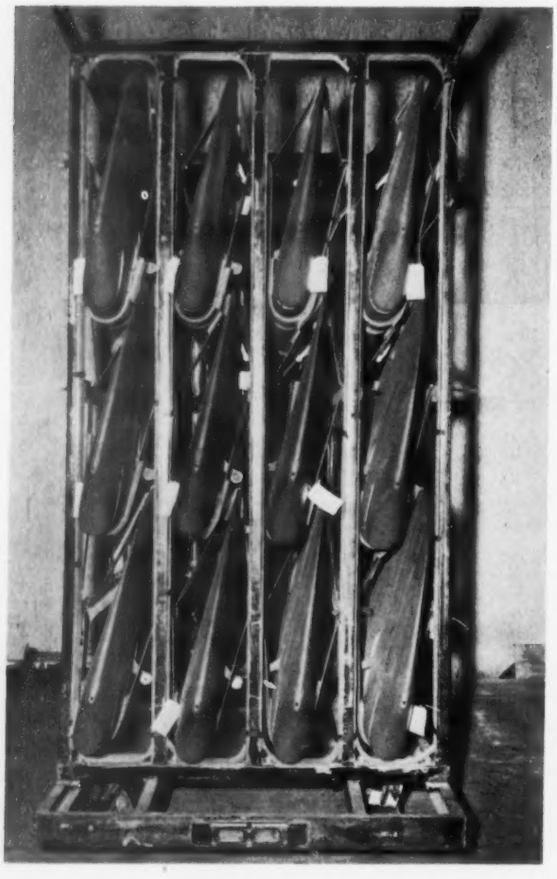
Sulphur can be brought within limits by ladle desulphurizing treatments. Phosphorus is not quite so easy, although it might be eliminated in a basic electric furnace. There has been some recent investigation launched of other dephosphorizing methods currently in use in the country. One is that practiced by Tennessee Coal, Iron & Railroad Co., U. S. Steel subsidiary, in Alabama, where bessemer steel regularly is being dephosphorized in tilting open hearths. A reduction of from 0.90 to 0.025 per cent is routine, even with carbon as high as 3 per cent.

Blast furnace metal is transferred in hot metal mixers to 25-ton bessemers where it is blown to the desired manganese, silicon and carbon limits and then moved in ladles to 175-ton open hearths. A slag is formed in the open hearth by adding 20,000 pounds of Alabama iron ore and 20,000 pounds of 90 per cent burned limestone. To increase the boiling action a small weight (depending upon the final carbon content desired) of high-blow (high carbon) bessemer steel is added. After 10 minutes, the furnace is tilted and the slag poured off. At this stage the phosphorus has been reduced (by oxygen from the ore) from 0.90 to 0.10 per cent. Then another 40,000 pounds of the ore-lime mixture is added and the boil continued for 30 minutes, further reducing the phosphorus to about 0.025 per cent.

The furnace is tilted in the opposite direction to tap the steel, a skimmer bar holding back the slag which is kept in the furnace and used as the initial slag in the next heat. About 25 tons of steel also is left in the furnace, for it has been found that if this metal is tapped it will rephosphorize quickly for some reason. Time between taps in the open-hearth heats is roughly 2 hours, which is pretty fast handling of 140 tons of steel.

At least one of the motor companies has been actively pursuing investigations of dephosphorizing and one large steel foundry interest also has been looking into the subject. There is another and patented dephosphorizing system, known as the Yocum process, which is practiced by Wheeling Steel Corp.

Containers for Auto Parts Now Carry Aircraft Units



STEEL-FRAME containers, used widely in shipment of automobile parts, have been converted by Fisher Body Division of General Motors to efficient transportation of bomber sections. These parts formerly were shipped in wooden crates which required excessive construction work, heavy freight charges because of the 2-3 pounds of dunnage for each pound of goods, and complete loss of crate after unpacking. Steel containers, used continuously, average only 1.5 pounds dunnage per pound of goods. Containers are loaded with wings, rudders, stabilizers, ailerons and like parts, each piece being held in place with strong elastic straps to absorb impacts, the containers themselves being equipped with rubber-mounted "knee action" casters. Several containers are shipped in a single car which is provided with special brackets to hold them.

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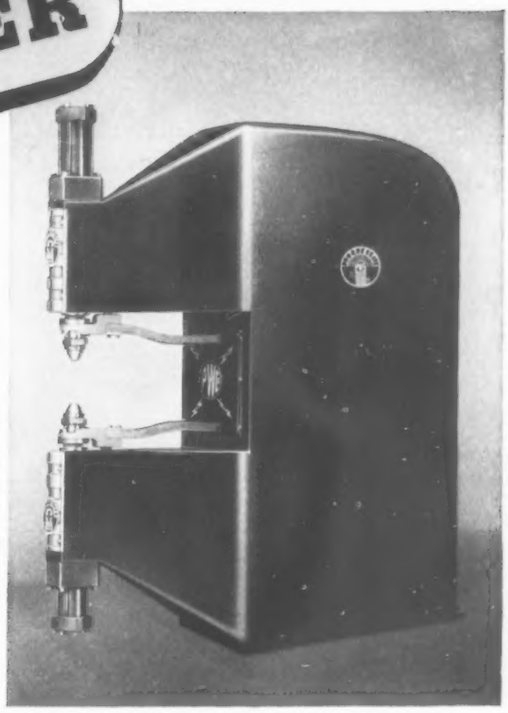
Announcing the TEMP-A-TROL* FORGE WELDER

*Copyrighted and patented. Other patents applied for.



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3. Controls: Ductility, grain refinement, homogenization. Avoids annealing of hardened surface.
4. Eliminates the human element in selecting weld and heat-treat cycles, etc.

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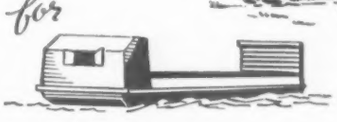
2. Special alloy steels, such as homogeneous and face-hardened armor plate, etc.

HOW IT DOES IT:

1. Temperature AT the weld itself controls weld and heat-treat cycles—*automatically*.
2. Merely set dials for weld and heat-treat temperatures desired. Machine is self-compensating for all such variations as normal differences in metal thickness, induction and short-circuiting losses, presence of scale, etc.

for

for



Information on the new process will be furnished at present only to organizations engaged in or contracted to engage in war production work. Please address all inquiries direct to:

PROGRESSIVE WELDER CO.

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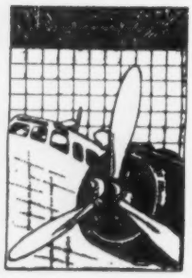
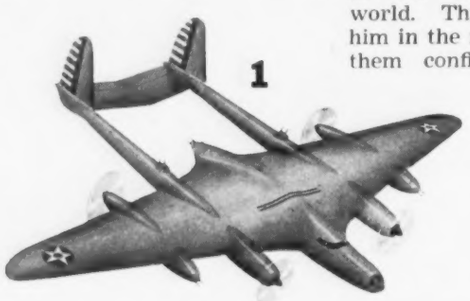
WING TIPS

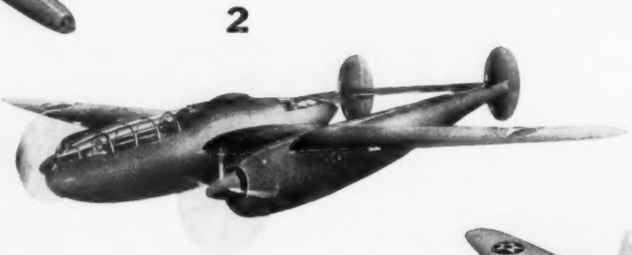


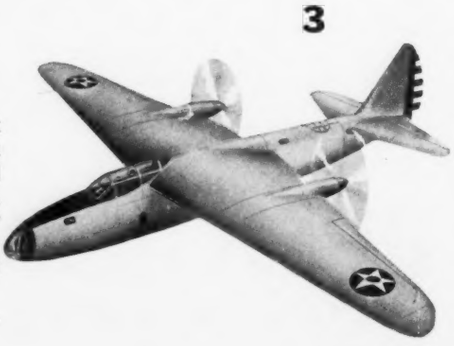
Army Air Corps' Design Development Unit functions like new model designers in automotive field . . . Consider warplane as problems in mechanics, then supervise "shotgun wedding" of military demand and technical possibility . . . Engine nacelles and area under fuselages and wings prove true ability of engineers . . . Glenn Martin salvage operations increased . . . Airlines assigned A-1-j rating for equipment

TOMORROW'S airplanes, like new automobile models, make intriguing subjects for discussion, even at a time when attempts are being made to freeze plane designs long enough to turn out a semblance of mass production. In the laboratories and drafting rooms of the Materiel Division of Wright Field, just as in the styling sections of motor companies in past years, engineers, artists and designers work behind locked doors in the creation of new flying weapons.

These experts, or aerodynamists as they are called, look upon even the most successful of current aircraft as obsolete stuff. The are climbing off the apex of modern achievement into a realm one, two, five years hence, seeking to fit together from their advanced knowledge military aircraft which will fly higher, faster, farther than anything today.







In their search for the new and the better they often deviate sharply from standard concepts, producing designs resembling bats, fish, swallows or even prehistoric creatures. A lot of these radical flying shapes are simply probes of trends which never will appear in flight, or even get beyond the drawing board; but the information obtained from exploration of a trend may prove invaluable.

These advance agents of aircraft design are grouped into a Design Development Unit of the Aircraft Laboratory at Wright Field, and include civilian engineers and officers of the Army Air Forces. They correspond to the new model design engineers of the automobile companies, and they operate similarly, either under directives issued by the Air Corps or on original design ideas. In fact, one of the assistants on this aircraft staff was formerly active with the styling division of Chrysler Corp.

Basically equipped for his work with an extensive education in aeronautical engineering, flying experience and definite mental acuity, the airplane design engineer must know the oldest and newest information obtainable regarding the earliest and latest airplane development trends in this and every country in the world. This information comes to him in the form of reports, many of them confidential military intelligence documents. He also has at hand detailed studies of the design and performance of each individual airplane flying in the service today, under production for service, under test for production, and in the preliminary wind tunnel model test stage.

In a design worked up by the Design Development Unit, complete engineering data are included and are submitted, along with a painting or sketch of the new craft, to an Air Corps Board composed of experienced members of the tactical squadrons of the Combat Command. These are pilots who look upon an airplane as a practical flying weapon for use under highly specialized fighting conditions.

Under the second method, the Air Corps Board issues a directive to the Design Development Unit, specifying one or more characteristics considered essential, such as range, speed, altitude, fire power and the like. The designers then supervise the "shotgun wedding" of military demand and technical possibility.

To designers, the important thing is the realization of desired characteristics, not the form of the structure in which they are embodied. They see an airplane as simply the solution of a problem in mechanics, a balancing of a series of forces which are not in equilibrium. One officer on the Unit expresses it this way, "To the impartial physicist, a propeller on the tail is no more odd than a propeller on the nose."

Certain proved forms, however, can be counted on for definite results

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PERFORMANCE DATA

OPERATION—Turn O.D. and face sides of gears—S.A.E. 4615.

MACHINE—Sundstrand Automatic Lathe.

CUTTING LUBRICANT—1 part Sunoco to 20 parts water.

Courtesy of Sundstrand Machine Tool Co.

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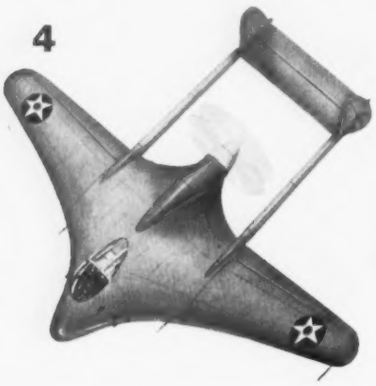
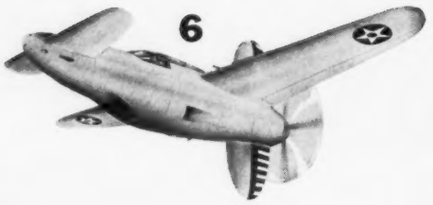
and when radical changes in these forms are made it is at best a venture into the unknown which may or may not prove successful. The further the departure from the known and tested, the greater will be the ensuing manufacturing, operating and maintenance problems.

Occasionally, design development engineers from Wright Field discuss a planned model with plane builders but this is not a routine procedure. When it occurs, the manufacturer understands that the engineer is not intruding with his own ideas, but is rather making a suggestion upon which the industry is expected to improve.





As stated before a look into the future is always intriguing, even though it be a carefully guarded peek. Herewith are six new plane concepts from the drawing boards of the Design Development Unit. Few of the secrets they embody can be determined from these bare exterior views. Other countries are experimenting with the same ideas. However, it is inside the engine nacelles and beneath the fuselages and wings that the true ability of engineers is proved, and obviously the inner workings of these models are closely protected details.

In these new designs will be seen many instances of pusher-type propellers, which offer important advantages in speed or rate of climb, and likewise do not have the limiting effect on top speed imposed by the tractor-type propeller.

In numerical order, the designs illustrated have been dubbed the "air whale," the "shrike," the "eagle," the "bat," the "windmill," and the "canard." Renderings are by J. N. Moyer, and reproductions are from official photography, U. S. Army Air Corps.

No. 1, a four-engine bomber, has its motors arranged for realizing the advantage of defensive fire power. Two propellers are of the pusher type, two of the tractor type. Double tail boom is suggestive of Lockheed designs. Consolidation of much of the fuselage into the wing, with enlargement of the wing form, is typical of "flying wing" designs.

No. 2, the "shrike," is a twin-engine plane with the tail surfaces supported on extensions of the motor nacelles, suggestive of the Lockheed P-38 styling. It permits concentration of fire power directly forward and aft while the multiple-gun turret atop the cabin gives a full circle sweep of fire.

No. 3 features two inboard or submerged power plants, driving through geared shafts two outboard pusher-type propellers. A high-wing monoplane, it would provide excellent visibility for pilot and gunners.

No. 4 is a modification of the flying wing, with submerged engine driving two counter-rotating propellers. Advantages of an enlarged center section wing with a relatively thin percentage characteristic are provided, as well as exceptional forward fire power.

No. 5 is a single-engine design with exceptionally thin wing and the propeller aft of the rudders and stabilizers, eliminating turbulent or rough air over the entire plane surface.

No. 6 is the fanciful "canard" or tail-first design, with propeller at extreme rear. Wings and stabilizers are seemingly interchanged, and a bottom rudder added. (Unexplained is how this type of plane would be landed).

Plane Builder Recovers 90% Scrap Aluminum

Materials salvage operations at the Glenn L. Martin Co., Baltimore, have been stepped up greatly and will be increased, it was revealed today by Harry F. Vollmer, vice president in charge of manufacturing. This information was contained in advices sent to the Industrial Salvage Section of the War Production Board.

Not only has the scrap aluminum recovery risen to 90 per cent of the company's waste metals this year, but it is expected that Martin will also salvage some 4,000,000 pounds of waste paper in 1942—paper which otherwise would have been burned.

Because of the pressing need for aluminum, methods have been found to recover the higher-grade alloys and put them back to work without lowering their efficiency, Mr. Vollmer explained. He declined to reveal just how the salvage was accomplished.

Commercial Airlines Assigned A-1-j Rating for Equipment

Deliveries of materials and equipment used by commercial airlines in the operation and maintenance of their services have been given the higher limited blanket preference rating of A-1-j by the WPB. Previously the rating was A-3, established by P-47, issued Sept. 12, 1941, and action by J. S. Knowlson, director of industry operations, last week is the first amendment to that order.

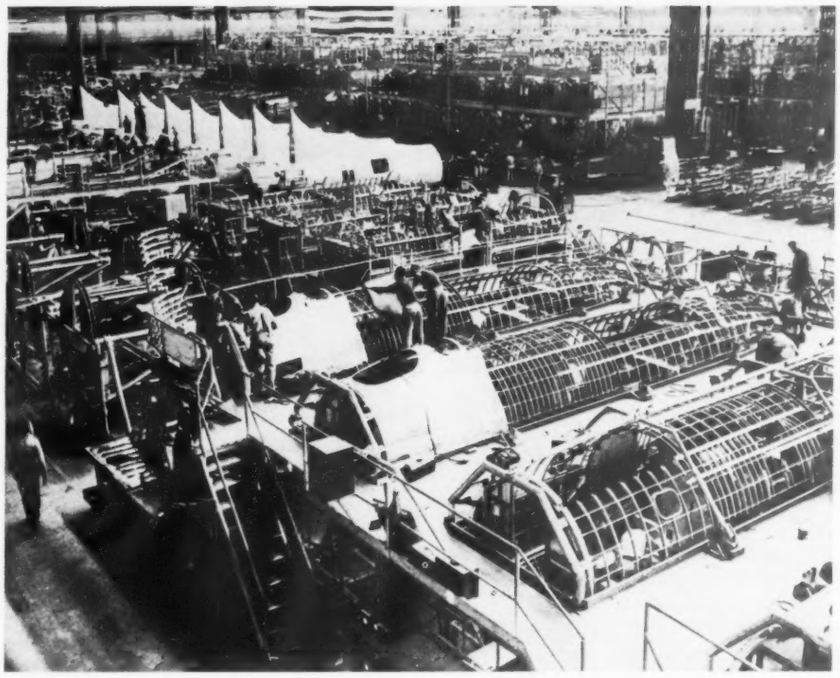
Other provisions of the original P-47 remain in effect.

Material-Tool Shortage "Retards Production"

War production is limited in northern New Jersey plants by insufficient material, machine tools and skilled help, the State Chamber of Commerce declared last week, replying to charges of Irving Abramson, president, New Jersey State Industrial Council of the CIO, that 77 plants were operating at only 49 per cent of capacity because they did not operate seven days a week and did not utilize fully the second and third shifts.

These factors, the chamber asserted, cannot be adjusted until materials and machine tools are available, when active training of people in the use of processing tools can begin.

L. H. Korndorff, president, Federal Shipbuilding & Dry Dock Co., Kearny, N. J., United States Steel Corp. subsidiary, said that the bottleneck, so far as his company is concerned, is in manufacture and supply of auxiliary equipment by outside companies, and all work in hand is on or ahead of schedule.

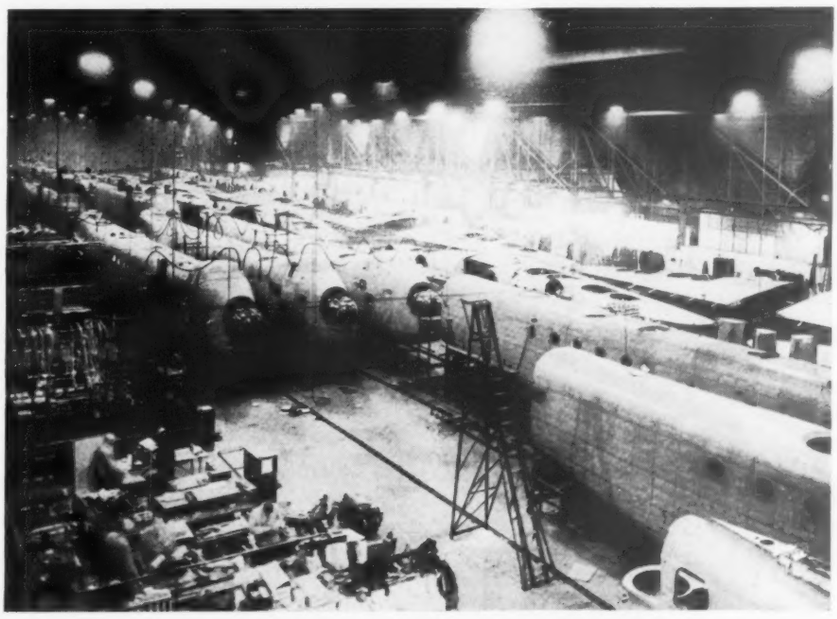


Jigs for Bombers in Boeing Plant

HOW rapidly and in what quantities United States Army Air Corps Flying Fortress bombers are being produced in the Seattle plants of Boeing Aircraft Co. is a closely guarded military secret. But that many of the great warplanes are rolling from the assembly line is apparent from the photo above, released for publication by the Army. Shown in the foreground is a jig in which the forward halves of fuselages are fabricated. Workmen are shown applying the metal "skin" to the ribbed framework. In the middle distance are fuselage tail sections. Forward and tail sections are bolted and riveted together before the wings, shown in the vertical jigs in background, are attached

♦

Below, completed fuselages for heavy 4-engined Stirling bombers are shown in a factory "somewhere in England." Technical training command of the Royal Air Force has designed courses to show airmen every stage in the construction of these bombers. NEA photos



Canada Restricts Nonferrous Metals To War Use

TORONTO, ONT.

SWEEPING restriction on use of nonferrous metals are being put into effect by C. D. Howe, minister of munitions and supply. Effective immediately sales of virgin zinc are prohibited, except by permit of the metals controller.

In peace-time Canada used about 40,000,000 pounds of zinc annually for galvanizing, more than half total consumption. Most of this will be diverted to war production. As pure rolled zinc it is needed for ammunition powder boxes, as oxide in tires and as a component of brass for cartridge boxes, small arms and ships. Brass, already greatly limited, will be curtailed further.

Use of copper, zinc and other nonferrous metals for extension of gas, water, sewage or power services will be drastically curtailed. G. C. Bateman, metals controller, has issued notice that permits must be obtained for such use, except for the government, necessary emergency repairs and replacements and essential electric installations requiring less than 500 feet of wire.

The metals controller also has issued an order prohibiting use of tin, except by permit, for manufacture of all household articles. He also advised that except for stove and other heating pipe and fittings, milk pans and oil cans and possibly one or two other items steel will not be available as a substitute. Wood, enamel or pottery are suggested.

Metal Production Discussed

Canadian Institute of Mining and Metallurgy, at its annual convention March 9-11 discussed matters of importance to mining, metals production and manufacture. John Wulff, Massachusetts Institute of Technology, presented a paper on powder metallurgy. G. C. Bateman, metals controller, discussed development and use of strategic metals in war time, of which chrome, manganese, tin and tungsten must be imported. Some tungsten is now being produced, but in small quantities. He stated Canada now is producing about 6 per cent of its requirements of tin and aluminum output has been increased 1000 per cent.

M. F. Gudge, Federal Bureau of Mines, spoke on sources of magnesium in Canada and other speakers treated various aspects of metal supply.

MEN of INDUSTRY

C. L. AUSTIN has been elected treasurer, Jones & Laughlin Steel Corp., Pittsburgh. He succeeds **J. C. Watson,** who has resigned after 48 years of continuous service with Jones & Laughlin interests. Mr. Watson requested that he be relieved from active duties due to ill health. He continues as a director.

Mr. Austin and **W. L. Copeland** have been elected directors. The latter is in charge of the corporation's legal department. Mr. Austin was graduated from Princeton in 1924 and was associated with the Guaranty Trust Co. of New York until 1934. He went to Pittsburgh in 1935 as vice president and director of Mellon Securities Corp.

♦

Paul Keller has been appointed manager, tool, stainless and special steel sales, Copperweld Steel Co., Warren, O. A graduate of the University of Tennessee, Mr. Keller formerly was manager of Copperweld's Cleveland sales district.

♦

A. B. Crouch, D. L. Millham and **G. S. Hyatt,** of Schenectady, N. Y., and **C. E. Anderson** of Bridgeport, Conn., have been elected assistant comptrollers, General Electric Co.

♦

G. S. Mican has been named assistant to general superintendent, production planning of Carnegie-Illinois Steel Corp.'s South Chicago works. Associated with the South works since 1919, he was recently assistant division superintendent of rolling. **E. W. Pierce,** since 1937 superintendent of the production department, has become assistant to general superintendent, quality control. **R. A. Ballinger** has been promoted from assistant superintendent, production department, to succeed Mr. Pierce.

♦

Edward Riley has been elected a vice president, General Motors Corp., Detroit, succeeding **Graeme K. Howard,** who has resigned as vice president in charge of overseas operations. Mr. Howard is now serving in Washington as deputy chief, motor transport division, Quartermaster Corps. Mr. Riley has been general manager of General Motors overseas operations.

♦

R. B. Tucker, director of glass sales, Pittsburgh Plate Glass Co., Pittsburgh, has been elected to the board of directors. He succeeds **H. A. Galt,** who is retiring after more than 40 years of continuous service.

C. L. Austin

Paul Keller

R. A. Ballinger

♦

Clarence O. Bell has been appointed manager of Goodyear Tire & Rubber Co.'s Airplane Division, Aeronautics Sales Department. Since 1929 Mr. Bell had been flying sales engineer for the company.

♦

Robinson S. Kersh has been appointed manager, Houston, Tex., office of Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa. Since 1938 he had been associated with the machinery electrification and aviation section at East Pittsburgh.

♦

Fred H. Clausen has been elected to the board of directors, Giddings & Lewis Machine Tool Co., Fond du Lac, Wis. Mr. Clausen is president, Van Brunt Mfg. Co., Horicon, Wis.

♦

Ralph B. Rogers, president, Edwards Co., New York, has also been named president, Hill Diesel Engine Co., Lansing, Mich., recently acquired by the Edwards Co. Both companies maintain executive offices at 724 Garrison avenue, New York. For the present, no changes in Hill manufacturing or merchandising policies are contemplated, according to Mr. Rogers.

♦

T. A. Lynch, heretofore sales manager for the aeronautical industry for Reynolds Metals Co. Inc., has been elected a vice president.

♦

Abraham Block, formerly a member of the staff of Joseph Iron Co., Aurora, Ill., iron and steel scrap dealer, has taken over the company as result of the retirement of **Israel Joseph,** president. The company will continue to operate in the same location under the name of Abraham Block Iron & Metal Co.

♦

George Romney has been named general manager, Automobile Manufacturers Association, Detroit, succeeding **Pyke Johnson,** who has resigned to become president, Automotive Safety Foundation. Mr. Romney, Detroit manager of the A.M.A., was appointed managing di-

G. L. Crawford

rector of the Automotive Council for War Production in January, shortly after that group was organized to expedite war output in the automotive industry.

♦

Gordon L. Crawford, sales manager, Buffalo district, Wickwire Spencer Steel Co., has been transferred to New York as assistant general sales manager. He will continue as sales manager of the company's structural products division. Mr. Crawford joined Wickwire Spencer in 1927 as a salesman in Chicago, serving there and in Tulsa, Okla., until 1935 when he went to the New York sales office. He became district sales manager at Buffalo in May, 1940.

♦

Ronald R. Monroe has been elected vice president, J. G. Brill Co., in charge of manufacturing and purchasing, with headquarters at Philadelphia.

♦

Theodore W. Monroe has been elected president, Hartford Electric Steel Corp., Hartford, Conn., and its affiliated company Roxbury Steel Casting Co., Boston. **George C. Hagstrom,** vice president and sales manager, has been made executive vice president of the Hartford company, and continues as vice president of the Roxbury organization.

♦

Sam B. Heppenstall Jr., formerly general sales manager, Heppenstall Co., Pittsburgh, has been promoted to vice president in charge of sales. Mr. Heppenstall joined the company 14 years ago as a laborer, was made assistant sales manager in 1933 and general sales manager in 1939.

♦

R. L. McIlvaine has been promoted to manager of engineering sales, National Engineering Co., Chicago. Prior to joining the company in June, 1941, he was associated with

Ronald R. Monroe

Swayne Robinson Co., Richmond, Ind. He is a member, American Society of Mechanical Engineers and American Foundrymen's Association.

♦

John Wilson has been promoted to production superintendent, Jessop Steel Co., Washington, Pa. Associated with the company since 1911, he has served in various capacities in the sheet mill, and in 1931 was made superintendent of that department.

♦

N. F. Melville has been made manager of munitions sales, Pittsburgh Steel Co., Pittsburgh. He has been associated with the company in various sales capacities the past 15 years, and continues his duties as manager of manufacturers sales.

♦

Walter C. Evans, associated with Westinghouse Electric & Mfg. Co., 21 years, since 1936 in charge of the company's broadcasting activities, has been appointed general manager of the radio, broadcasting and X-ray divisions. Each of the divisions has an individual manager, working under direction of Mr. Evans. **Lee B. Wailes** is manager, broadcasting division; X-ray division is headed by **Clair V. Aggers,** and **Carrol J. Burnside** is manager, radio division.

Executive offices of the X-ray division have been moved to Baltimore, where the radio division has a large manufacturing plant, and the broadcasting division headquarters will remain in Philadelphia.

General Electric Co., Schenectady, N. Y., has made available a broad line of aircraft control devices, including solenoids, relays, contactors and pressure and limit switches, some also applicable to tank and other installations. These devices are designed to assure minimum weight and size, for operation at great altitudes under wide ranges of temperature and severe vibration conditions.

Gets 'Em Out and On the Job

SAMUEL BURNS JR., tractor driver in the employ of National Tube Co.'s Ellwood Works, Ellwood City, Pa., lives 2½ miles from the plant and a half mile from the main highway. A heavy snowstorm recently blocked the road surrounding the plant. Burns, unable to use his car, took his tractor and opened the road. Later cars parked near the plant were unable to move due to drifting. Burns mounted his tractor and opened the road for the stranded cars, permitting steel production to continue

War Industrial Plant Expansion Costs Aggregate $7,366,000,000

WASHINGTON

ESTIMATED cost of war industrial plant expansions approved through Dec. 31, 1941, totaled $7,366,000,000, according to the War Production Board's statistics division.

Commitments of public funds, including those of foreign governments financing factories in the United States, amounted to $6,040,000,000, or 82 per cent of the total estimated cost. Of this, commitments by the United States government totaled $5,885,000,000, and those of foreign governments amounted to $155,000,000. The estimated cost of private expansions, as represented by necessity certificates approved, was $1,326,000,000.

Plant expansions estimated to cost approximately $991,000,000 were approved during December. Of this amount, the United States government made commitments totaling $818,000,000, while private financing, as measured by necessity certificates approved, amounted to approximately $173,000,000.

Largest amount spent for facilities to produce any one type of product was $1,627,551,000 for explosives, ammunition assembling and loading (excluding small arms). For aircraft, engine, parts and accessory plants, $1,066,621,000 was expended. Iron and steel facilities took the third largest amount, $855,718,000, followed closely by shipbuilding facilities with $852,518,000.

War Expenditures Increase 17.6 Per Cent in February

Daily rate of expenditures for the war effort in February neared the $100,000,000-a-day mark. The February increase in the rate of spending indicates an accelerated tempo in the war production effort.

Treasury Department checks paid for war purposes, plus Reconstruction Finance Corp. disbursements, came to $2,330,000,000. With 24 working days in February the daily rate was $97,100,000, an increase of 17.6 per cent over the previous month. This is the highest increase in the rate of daily spending for any month since last September, when the daily rate rose 24.5 per cent over that of August.

Completes Reorganization of WPB Bureau of Industry

Reorganization of the Bureau of Industry Branches, WPB Division of Industry Operations, has been completed by Philip D. Reed, bureau chief. Several of the branches in the bureau have been divided, and the total number is now 24.

Mr. Reed's top staff now consists of Amory Houghton, deputy bureau chief; John R. Kimberly and Joseph R. Taylor, assistant bureau chiefs; W. B. Murphy, Nathaniel G. Symonds and Ben Alexander, special assistants; Marshall J. Dodge Jr., executive assistant.

Branches and chiefs include:

Automotive—Ernest Kanzler.

Rubber and rubber products—Arthur Newhall.

Service and distribution, office and service machinery—Nathaniel G. Burleigh.

Special industrial machinery—Lewis S. Greenleaf Jr.

Construction machinery—A. Stevenson (acting).

Air conditioning and commercial refrigeration—J. M. Fernald.

Transportation—A. Stevenson.

Communications—Leighton Peebles.

Farm machinery and equipment—William R. Tracy.

General industrial equipment—Charles S. Williams.

Safety and technical equipment—H. T. Rosenfeld.

Plumbing and heating—W. W. Timmis.

Building materials—John Haynes.

Containers—Douglas Kirk.

Other branches relate to textiles, foods, toiletries, etc.

Seeks Ways To Reduce Tin In Collapsible Metal Tubes

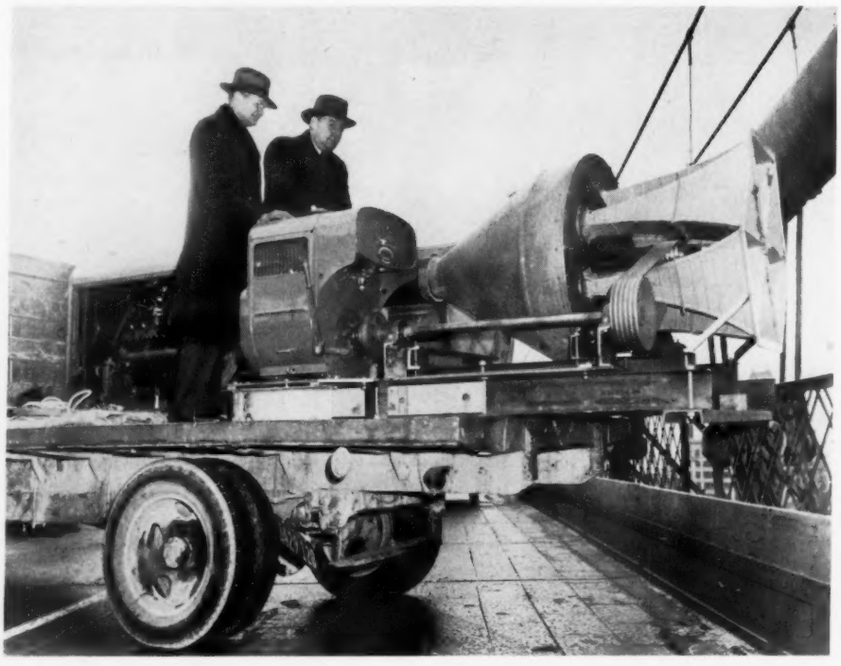
Containers Branch of the WPB is studying a plan to reduce the amount of tin consumed by collapsible metal tubes, and to eliminate the packing of nonessential items in such containers.

Following a conference with the industry last week, the branch has under consideration the serviceability of tin-coated lead tubes and tin-lined alloys for many products. The percentage of tin which will be permitted in such alloys or coated metal has not been determined, but it will be consistent with health standards.

Wherever possible, the branch will require the use of salvaged instead of pure tin by tube manufacturers.

Training of farm women and girls in the operation of tractors, milking machines and other farm equipment has been undertaken on a nationwide basis by International Harvester Co., through its dealers, it was announced last week.

Powerful New Siren Developed for Air-Raid Warnings



THIS powerful, mobile air-raid siren, developed by Bell Telephone Laboratories, was tested recently in New York and was heard over an area of many miles. The sound device is operated by means of compressed air. First air raid sirens tested in New York last December were too small and were heard only a few blocks away

FINANCIAL

Iron, Steel Groups' Return On Investment Below Average

THIRTY-EIGHT companies classified as "iron and steel" reported total net income of $299,582,000 in 1941, compared with $266,165,000 in 1940, according to National City Bank of New York. Total for 259 companies in the "metal products group" was $578,109,000 in 1941 and $479,429,000 in 1940.

The study covers 825 manufacturers, with 1941 net income of $1,539,372,000, and 1940 net of $1,243,969,000, representing a return on investment of 11.9 per cent. The iron and steel group showed a net return of 9.6 per cent, and the metal products firms 11.5 per cent.

The net profit on investment for 10 soft drink companies in 1941 was 19.9 per cent; drug and soap firms, 20.8 per cent. Highest return was shown by the general transportation equipment group, with 48.2 per cent. Household equipment reported 22.8 per cent, and automobile equipment 22.2 per cent.

Sheet & Tube Expects Smaller Profit from 1942 Operations

Opinion is stated in Youngstown Sheet & Tube Co.'s annual report that corporate earnings in 1942 will be substantially less than the $16,124,400 reported in 1941, which was equal to $9.13 a common share.

Reasons advanced for less favorable prospects are increases in material costs, higher transportations costs, important changes in consumer demands for particular products, exhaustion of some inventories carried into and shipped in 1941 and the probability of greater federal taxes.

With regard to the labor situation the report emphasizes that the company will oppose SWOC demands for the check-off and a wage increase.

Armco Earnings 7 Per Cent on Invested Capital

American Rolling Mill Co. earned 7 per cent on invested capital and 6½ per cent on sales in 1941. Net profit amounted to $11,228,475, equal to $3.21 per common share, against $7,642,714, or $1.96 on common in 1940. Sales totaled $169,178,239 compared with $112,363,529, while total shipments of finished and semifinished products showed a 44.5 per cent increase over 1940's record shipments.

Follansbee Sales $15,430,000; Net Earnings $445,963

Follansbee Steel Corp., Pittsburgh, reports net sales for 1941 of $15,430,144, and consolidated net earnings of $445,963, equal to $1.46 per share on the 217,966 outstanding common shares, after allowing for dividend requirements on 25,516 shares of 5 per cent preferred stock. Depreciation was $315,799, and amortization $256,344. Taxes totaled $523,370. Company's $2,100,000 loan was reduced by $504,012, leaving a balance, as of March 10, 1942, of $1,595,988.

Laclede Steel Co. 1941 Profit Triples Previous Year

Net profit of Laclede Steel Co. was $748,796, or $3.63 a share on capital stock, last year. This compares with net of $273,485, equal to $1.33 per share in 1940.

Thomas R. Akin, president, states in company's annual report that today it has a large tonnage of unfilled orders, excellent operating conditions, and a liquid financial position. Scarcity of scrap is causing curtailed operations in the steel industry and may result in considerable trouble.

Shipments last year were 30 per cent above 1929, best previous year. Nearly 94 per cent of January 1942 shipments were on government priorities.

McKee's 1941 Contracts 80 Per Cent Over 1940

Arthur G. McKee & Co., Cleveland engineers and contractors, report dollar volume of contracts in 1941 was 80 per cent greater than in the previous peak year of 1940. Present indications are that the company will obtain another large volume of business for 1942. Several large contracts already have been awarded the company and numerous inquiries, both for oil and iron and steel plant construction, are on hand.

On the basis of unaudited accounts as of March 7, cash and accounts receivable totaled $3,550,754. Accounts and notes payable, plus provisions for federal and foreign income and other federal taxes, amounted to $2,119,020.

Company has declared regular dividend of 25 cents and an extra dividend of 50 cents on class B stock, payable April 1 to record March 20. Dividend disbursements to date in 1942 total $1.50 a share.

Climax Molybdenum Co. Net Shows Substantial Increase

Net profit of Climax Molybdenum Co. totaled $8,954,205 in 1941, $3.55 per share on capital stock. This compares with net of $6,039,373, or $2.40 a share in preceding year; $10,309,586, equal to $4.09 a share, during 1939.

Company has declared a dividend of 30 cents a share on capital stock, payable March 31 to record March 21.

Copperweld Steel Co. Earnings Up Slightly in 1941

Net profit of Copperweld Steel Co. was $1,460,791 last year, equivalent to $2.61 per share on common stock, S. E. Bramer, president, states. This compares with $1,281,712, or $2.26 a share, earned in preceding year.

Provision for taxes in 1941 totaled $2,624,649, in comparison to $314,437 in 1940.

SHE STOOPS TO CONQUER: This woman worker in a British steel mill rates high as an inspector of plates. Photographs recently released by the censor show English women now engaged in heavy metal work where muscular strength counts more than good eyesight and judgment

Otis Steel Stockholders To Vote April 24 on Sale to Jones & Laughlin

E. J. KULAS, president, Otis Steel Co., Cleveland, last week announced a plan of sale and liquidation which contemplates sale of the assets of the Otis company to Jones & Laughlin Steel Corp. and distribution of the proceeds among Otis shareholders.

The plan is in the hands of Otis shareholders with a proxy statement and notice of a special meeting of shareholders, to be held April 24.

H. E. Lewis, chairman and president, Jones & Laughlin Steel Corp., said today that it was expected that Mr. Kulas would be elected a director and vice chairman of the executive committee of Jones & Laughlin, and be actively associated in the management of the company.

Products Are Complementary

While Otis and Jones & Laughlin are both members of the steel industry, their businesses supplement rather than duplicate each other to a substantial extent in plant facilities, in products manufactured and in sales outlets.

Upon consummation of the plan, Mr. Kulas states, it is believed that an operating unit will result which will be stronger, better rounded and, consequently, better able to meet competition than either of the present companies. It is also expected that unified management and administration will result in economies in production costs, overheads, sales efforts and other fields.

The plan as submitted, proposes that the holders of shares of convertible first preferred stock of Otis will receive for each such share:

1. ¼ share of the 5 per cent cumulative preferred stock, series A ($100 par), of Jones & Laughlin, and
2. ¼ share of the 5 per cent cumulative preferred stock, series B, Convertible ($100 par), of Jones & Laughlin, which is convertible into common stock of Jones & Laughlin at the rate of 3 shares of common stock for each full share of such Series B stock, and
3. 1 share of common stock (without par value) of Jones & Laughlin, and
4. Payment in cash by Otis of the accrued unpaid dividends on its preferred stock. Such accruals will amount to $6.875 a share on March 14, 1942, after the payment of a dividend of $2.75 a share which has been declared for payment on that date.

Holders of shares of common stock of Otis will receive for each such share:

1. ¼ share of common stock of Jones & Laughlin Steel Corp. and
2. $1 in cash.

The sale will unite two of the oldest steel companies in the United States, Jones & Laughlin having been established in 1850 and Otis dating back to 1873.

Otis now operates two plants in Cleveland, with a combined ingot capacity of approximately 1,000,000 net tons annually. Jones & Laughlin is a fully integrated steel company, whose plants located at Pittsburgh and Aliquippa, Pa., have an ingot capacity of approximately 4,000,000 tons annually. It not only produces a diversified line of rolled steel products but also owns and operates iron ore and coal properties having a productive capacity of more than 4,000,000 tons of iron ore and 5,000,000 tons of coal annually.

During 1941 Jones & Laughlin earned approximately $16,275,000 or $10.85 on each share of its common stock, compared with earnings of approximately $10,275,000 or $6.06 a common share during 1940. Otis earned approximately $2,170,000 during 1941 or $1.54 a common share, compared with $717,000 or a loss of 4c for each share of common stock during 1940.

February Ingot Rate Close to Peak

OUTPUT of steel ingots and castings in February was at the second highest rate on record. Average weekly production, 1,631,278 net tons, was only 3639 tons, about ¼ of 1 per cent, under the all-time peak of 1,634,917 tons in October, 1941, according to the American Iron and Steel Institute. Weekly output in January averaged 1,609,334 tons.

Total production in the shorter month was 6,525,111 tons, compared with 7,129,351 tons in January, but nearly 5 per cent more than 6,237,900 tons in February, 1941.

During February the industry operated at an average of 96 per cent of capacity, in contrast with 94.7 per cent in January. In February, 1941, when steelmaking capacity was substantially less than at present, the rate of operation was 96.6 per cent of capacity.

STEEL INGOT STATISTICS

	Estimated Production—All Companies									
	Open Hearth		Bessemer		Electric		Total		Calculated weekly production, all companies	Number of weeks in month
	Net tons	Per cent of capacity	Net tons	Per cent of capacity	Net tons	Per cent of capacity	Net tons	Per cent of capacity	Net tons	
Based on Reports by Companies which in 1940 made 98.43% of the Open Hearth, 100% of the Bessemer and 85.82% of the Electric Ingot and Steel for Castings Production										
1942										
Jan. . .	6,332,628	95.4	490,864	86.0	305,859	96.3	7,129,351	94.7	1,609,334	4.43
Feb. . .	5,795,932	96.7	453,543	88.0	275,636	96.1	6,525,111	96.0	1,631,278	4.00
Based on Reports by Companies which in 1940 made 98.43% of the Open Hearth, 100% of the Bessemer and 85.82% of the Electric Ingot and Steel for Castings Production										
1941										
Jan. . .	6,276,429	99.1	451,637	76.0	200,019	91.0	6,928,085	96.9	1,563,902	4.43
Feb. . .	5,673,289	99.2	378,330	70.5	186,281	93.9	6,237,900	96.6	1,559,475	4.00
Mar. . .	6,461,936	102.0	460,169	77.4	209,536	95.4	7,131,641	99.7	1,609,851	4.43
1st quar	18,411,654	100.1	1,290,136	74.8	595,836	93.4	20,297,626	97.8	1,578,353	12.86
Apr. . .	6,135,941	100.0	395,009	68.6	225,999	106.2	6,756,949	97.6	1,575,046	4.29
May . .	6,365,172	100.5	444,361	74.8	243,705	110.9	7,053,238	98.7	1,592,153	4.43
June .	6,103,767	99.5	458,242	79.6	238,721	112.2	6,800,730	98.2	1,585,252	4.29
2nd qtr	18,604,880	100.0	1,297,612	74.3	708,425	109.8	20,610,917	98.2	1,584,237	13.01
1st half	37,016,534	100.1	2,587,748	74.5	1,304,261	101.6	40,908,543	98.0	1,581,312	25.87
July . .	6,089,859	96.6	489,239	85.0	242,584	87.4	6,821,682	93.4	1,543,367	4.42
Aug. .	6,243,100	96.6	495,523	85.9	262,334	94.4	7,000,957	95.7	1,580,351	4.43
Sept. .	6,058,731	97.0	500,687	89.8	260,288	96.9	6,819,706	96.4	1,593,389	4.28
3rd qtr	18,391,690	96.0	1,485,449	86.8	765,206	92.9	20,642,345	95.2	1,572,151	13.13
9 mos.	55,408,224	98.7	4,073,197	78.6	2,069,467	98.2	61,550,888	97.0	1,578,228	39.00
Oct. . .	6,427,977	99.4	532,862	92.3	281,843	101.4	7,242,683	99.0	1,634,917	4.44
Nov. . .	6,198,368	99.0	488,986	87.5	282,633	105.0	6,969,987	98.3	1,624,706	4.29
Dec. . .	6,395,387	99.2	481,706	83.6	286,906	103.4	7,163,999	98.1	1,620,814	4.42
4th qtr	19,021,732	99.2	1,503,555	87.8	851,382	103.2	21,376,669	98.5	1,626,839	13.14
Total. .	74,429,956	98.8	5,576,752	80.9	2,920,849	99.6	82,927,557	97.4	1,590,479	52.14

The percentages of capacity operated in the first six months of 1941 are calculated on weekly capacities of 1,430,102 net tons open hearth, 134,187 net tons bessemer and 49,603 net tons electric ingots and steel for castings, total 1,613,892 net tons; based on annual capacities as of Dec. 31, 1940 as follows: Open hearth 74,565,510 net tons, bessemer 6,996,520 net tons, electric 2,586,320 net tons. Beginning July 1, 1941, the percentages of capacity operated are calculated on weekly capacities of 1,459,132 net tons open hearth, 130,292 net tons bessemer and 62,761 net tons electric ingots and steel for castings, total 1,652,185 net tons; based on annual capacities as of June 30, 1941 as follows: Open hearth, 76,079,130 net tons, bessemer 6,793,400 net tons, electric 3,272,370 net tons.

The percentages of capacity operated in 1942 are calculated on weekly capacities of 1,498,029 net tons open hearth, 128,911 net tons Bessemer and 71,682 net tons electric ingots and steel for castings, total 1,698,622 net tons; based on annual capacities as of Jan. 1, 1942 as follows: Open hearth 78,107,260 net tons, Bessemer 6,721,400 net tons, electric 3,737,510 net tons.

Government Inquiries

The following prime contracts are pending, with closing dates for bids as indicated. QR refers to quantity required. Bidding forms on these items can be obtained only by wiring, mentioning schedule number, to the Procurement Branch of the service heading the list of requirements. Field offices of Contract Distribution Branch, WPB, generally have available for inspection and examination, schedules, invitations, specifications and drawings (where required) concerning these contracts.

BUREAU OF SUPPLIES, ACCOUNTS NAVY DEPARTMENT, WASHINGTON

471—Hand and leg irons, QR-2998. Bids Mar. 20.

476—Ammunition boxes, mark I, for 40 mm. ammunition, QR-200,000. Bids Mar. 27.

478—Calcium carbide, in 100 lbs. drums, lump size, QR-400 lbs., nut, QR-1,420,000 lbs., ¼ size, QR-150,000 lbs. Bids Mar. 20.

482—Door closers, liquid, QR-4928. Bids Mar. 20.

500—Steel strapping, packing case, QR-large. Bids Mar. 20.

541—Laundry equipment, tumblers, QR-120; and ironers, QR-108. Bids Mar. 24.

551—Portable pumps, submersible, complete D. C., 115 volts, QR-384; 230 volts, QR-151. Bids Mar. 24.

554—Hammers, universal, spare parts and tools, 115 volt, QR-20. Bids Mar. 24.

556—Cuprous-oxide, in metal drums, QR-1,000,000 lbs. Bids Mar. 20.

558—Stockless anchors, steel castings and steam hammer forgings, sizes, 2200, 2500, 4000, 13,000, and 30,000 lbs., QR-158. Bids Mar. 24.

560—Pins: cotter, escutcheon and taper, steel and brass, large quantities. Bids Mar. 27.

562—Dry zinc oxide, QR-1,521,000 lbs. Bids Mar. 20.

563—Motor trucks, load capacity 5000 lbs., QR-5. Bids Mar. 24.

566—Wire cloth, bronze, copper and galvanized steel, QR-Large. Bids Mar. 27.

580—Dry red lead, 95% grade, QR-463,000 lbs.; dry white lead, QR-550,000 lbs. Bids Mar. 27.

WAR DEPARTMENT, AIR CORPS WRIGHT FIELD, DAYTON, O.

42-2130—Brake, press, sheet metal, ¼", ⅛", 14 and 16 gauge capacity, QR-117; bar folder, lengths 20" and 36", QR-51; slip roll former, QR-58; shear; scroll, rotary, squaring, slitting, plate and rod, notcher and straight, QR-437; combination turning machine, wiring and burring, 18 gage capacity, QR-38; commercial items. Bids Mar. 18.

PUGET SOUND NAVY YARD, BREMERTON, WASH.

3984-A—Calipers: firm joint and lock joint, QR-150; dividers, QR-84. Bids Mar. 23.

4481-A—Solder pots, electric, 1.5, 6.0, and 0.5 qt. capacity, QR-6. Bids Mar. 20.

4652—Tap extractors, steel fingers, ¼" to 1", QR-12 to 576 of ea. size. Bids Mar. 23.

4653—Pneumatic hammers, 6" stroke, ½" to ⅞" riveting capacity, QR-12. Bids Mar. 23.

4657—Combination box wrenches, ⅝", 1⅛", 1" and 1⅛", QR-300 of ea. Bids Mar. 23.

4648—Forgings, alloy steel, QR-2500. Bids Mar. 23.

4664—Pressure gages, 4½", QR-63; 6" steel tube, QR-33. Bids Mar. 23.

4665—Pneumatic scaling hammers, 1⅛" bore, 1¼" stroke, QR-24. Bids Mar. 23.

4666—Strip brass, ½" to 4" wide, QR-750 lbs. Bids Mar. 21.

4672—Steel plates, sheets, bars, and flats, QR-Large. Bids Mar. 21.

4674—Steel cable, 7 x 19, 5/32", QR-5,600'. Bids Mar. 24.

4675—Lubricating guns, pressure, 7½ oz., QR-430. Bids Mar. 25.

4681—Steel pipe, seamless or welded, ¾", 1¼", and 2½", QR-63,100'; seamless tubing, QR-600'. Bids Mar. 24.

4698—Reducing sockets, QR-520; wood boring, auger bits, QR-354; blacksmith fullers, QR-12. Bids Mar. 23.

4530—Hammers: pneumatic, riveting, 6" stroke, riveting capacity (dia.) ½" to ⅞", QR-12; drills: pneumatic and reversible and non-reversible reciprocating, QR-72. Bids Mar. 19.

4556—Locks, brass, door and drawer, with keys, QR-1188. Bids Mar. 16.

4562—Jacks: screw, type VI, capacity 12 tons, closed height (approx.) 13", QR-170. Bids Mar. 17.

4588—Bolts: steel, NCTS, carriage, black and galvanized, sq. neck, with sq. nuts; machine black, hex. head and nut; lag-steel bolts and deck; machine, screw, steel, NCTS, hexagon, castellated and regular nuts; iron or steel, lock; spring steel; and phosphor bronze washers; boat, copper rivets; rivet, copper burrs, QR-large. Bids Mar. 17.

Sub-Contract Opportunities

Data on subcontract work are issued by local offices of the Contract Distribution Branch, WPB. Contact either the office issuing the data or your nearest district office. Data on prime contracts also are issued by Contract Distribution offices, which usually have drawings and specifications, but bids should be submitted directly to contracting officers as indicated.

Chicago office, Contract Distribution Branch of WPB, 20 North Wacker Drive, is seeking contractors for the following:

33-N-224: A Chicago manufacturer has considerable work to sublet requiring hand screw machines with capacities ranging from ⅜" to 1¾" round bar stock, parts are made from stainless, nickel steel and S.A.E. 1025 to 1040, material will be furnished by prime contractor. Lots will vary in quantities from 150 to 500.

31-A-221: We have been requested to line up subcontractors for the production of 11 items, approximately 5,000,000 parts, for the bomb tail fuze, requiring the following equipment: Automatic screw machines with 1" capacity capable of holding .001 to .002 tolerances; single and 4 spindle automatic screw machines with capacities ranging from 1½" to 1¾" for brass and steel with .001 tolerance; high speed production hand millers for slitting and milling

How To Get War Work

MANUFACTURERS individually or in groups may confer with the Conversion Unit, Contract Distribution Branch, Production Division, War Production Board, 462 Indiana avenue, Washington. Members of this unit have been effective in finding ways to convert individual plants, groups of plants, and entire industries to war production; its staff is composed of experienced industrial specialists. Appointments may be made through C. A. Woodruff, chief, or by arranging with the nearest War Production Board Contract Field Office (see list of these offices on Page 21, Section Two, STEEL of Feb. 23).

It also is essential to contact the nearest Contract Field Office effectively in order to seek out subcontracting opportunities. Some of these field offices maintain exhibits of parts needed for war *materiel*. Manufacturers desiring such work should visit the nearest of these exhibits in order to ascertain which of these parts they are in a position to produce.

Manufacturers desiring war work also are urged to contact primary contractors energetically and persistently—as long as they feel that they have potentialities as subcontractors.

Many manufacturers have converted successfully through exercise of their own ingenuity, without any help from without. For example, a manufacturer of frames for women's handbags designed and now is producing in the form of a stamping a charger for a rapid-fire gun; formerly this gun part was a casting. The Navy tested the stamped part, weighing half as much as a casting, found it satisfactory and placed a large contract, giving this particular manufacturer assurance that he will stay in business.

For the country's sake, for their own sake, manufacturers not now engaged on direct or indirect war production, or the most essential civilian production, are urged to go "all-out" in seeking war work. They cannot sit by and wait for war work to be offered to them. They must go out and find it—or be faced with the possible alternative of being forced to suspend business.

—*The Editors*

in brass; for second operations, hand screw machines, drill presses and tapping equipment will be required; steel parts to be cadmium plated. Partial deliveries to be made in April and to be completed in September. Drawings available at this office.

37-N-223: A midwestern prime contractor finds it urgently necessary to sublet the work involved in the manufacture of five sets of punches and dies for the production of 105 m/m cartridge cases. The punches will vary from 5.125 inches diameter by 15.125 inches in length to 4.375 inches diameter by 28.750 inches in length, for each of the above sets of punches, dies of similar diameter will be required. This work will require heavy duty engine lathes, turret lathes, heat treating equipment and grinding and polishing equipment. Punches and dies to be made of steel comparative to Crucible Steel Co.'s "Athapnew" brand, and is to be furnished by the subcontractor. To be hardened to a minimum of 63 Rockwell "C". The quantities required would seem to assure a continuous run on the above specified equipment. (Code No. 79)

38-O-211: A large Midwestern machinery builder finds it necessary to locate a steel foundry with capacity and equipment to cast four large steel castings weighing about 25 to 30 tons, with overall dimensions of approximately 260 inches in length, 192 inches in width, with a thickness varying from 15 inches to 26 inches. Patterns have been made and are available. (Code No. 78)

39-N-226: Manufacturer requires subcontracting facilities for screw machine work 2½" to 3½" capacity. Chucking or turret lathes, similar capacity. Requirements: quantities from 10,000 to 150,000. Work required on steel bar and steel forgings.

41-A-227: Five to six hundred items of perishable tools consisting of dies, punches, bushings, guide rings, spindle nuts and ejecting stems. Continuous production for the duration. Contracts can be negotiated immediately. Drawing available. A-1-A priority.

21-F-N-217: Chicago prime contractor wishes to subcontract for centerless grinding operations on hardened steel airplane parts, such as special studs and bolts approximately ¾" diameter, varying in length up to 5", with shoulders and under-cuts. Close tolerance work, in quantities varying from 8000 to 100,000 pieces.

Cleveland office, Division of Contract Distribution, WPB, Union Commerce building, is seeking contractors for the following:

D-37: Subcontractor with facilities to fabricate 14 parts, made of alloy steel. Equipment indicated—automatic screw machines (¾" to 1¾" capacity) milling, drilling, hardening, grinding, and honing.

D-39: Facilities to furnish any or all of 73 parts required for complete field kitchen equipment. Materials are canvas, aluminum, steel, and cast iron. Will negotiate.

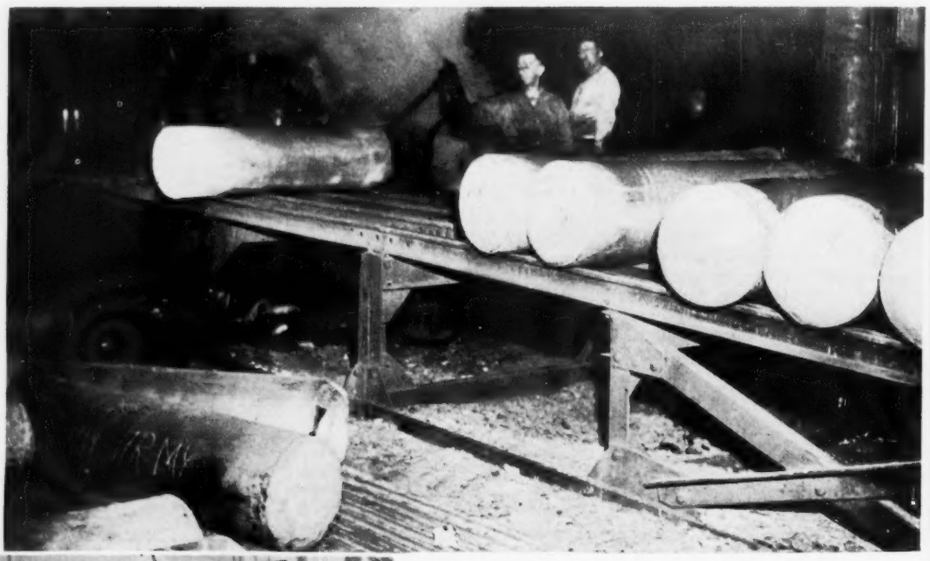
D-40: Miscellaneous parts required by War department. Present exhibit includes items required, varied facilities such as automatic screw machines, gear and worm gear cutters, grinding, heat treating, etc., also sheet metal and woodworking. Blueprints on file.

Minneapolis office, Contract Distribution Branch, Production Division, WPB, Midland Bank building, is seeking contractors for the following:

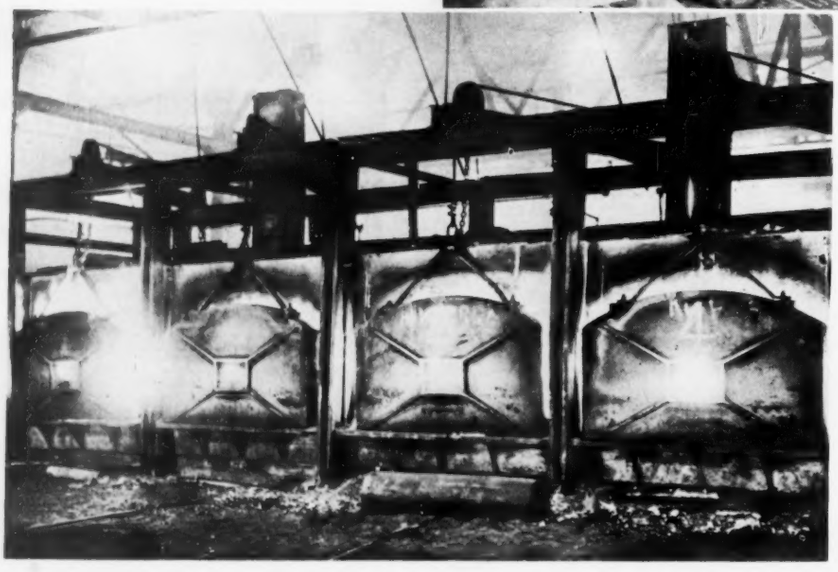
No. 172: Manufacturer desires to subcontract work on machining of aluminum alloy airplane structural parts. Operations are chiefly milling and drilling. Pieces vary from 3 to 13 feet long. Quantities variable.

Mass Production of Demolition Bombs

WITH several centuries of precedent behind it, artillery shell manufacture is an old story to makers of ordnance materiel. Large air bombs, however, are distinctly a development of the present war, and consequently there is considerable interest in processes for their mass production. Herewith are four Army Signal Corps photographs showing evolution of 500-pound demolition bombs "from furnace to filling stage" in a plant in the Philadelphia Ordnance District



Below, in this battery of furnaces, the demolition bomb forgings—one of which lies in the foreground—are being reheated between first and second drawing. At this stage they are closed-end steel cylinders but they have not as yet been sized, trimmed, "necked in" at the open end or rounded at the closed end



Above, having been reheated and subjected to a second draw, the bomb bodies roll along a transfer table made of steel rails toward the shears which will trim their open ends prior to "necking". Note how heat is held by thick, unfinished closed ends, on which press work still remains to be done

How To Utilize Facilities of Small Business for Larger War Production

By DON L. MILLER

The following article suggesting a plan whereby the War and Navy departments and small manufacturing plants may be of mutual assistance was submitted to the James F. Lincoln Arc Welding Foundation, Cleveland, and transmitted by the Foundation to STEEL *for widespread dissemination. The author is associated with Miller Products Co., manufacturer of bicycle accessories, Des Moines.*

SINCE there are thousands of little manufacturing plants that are unable to extend their services to the government in the form of war work because of the necessity of bidding, I believe the following idea might make the facilities of many welding shops and others available for such effort.

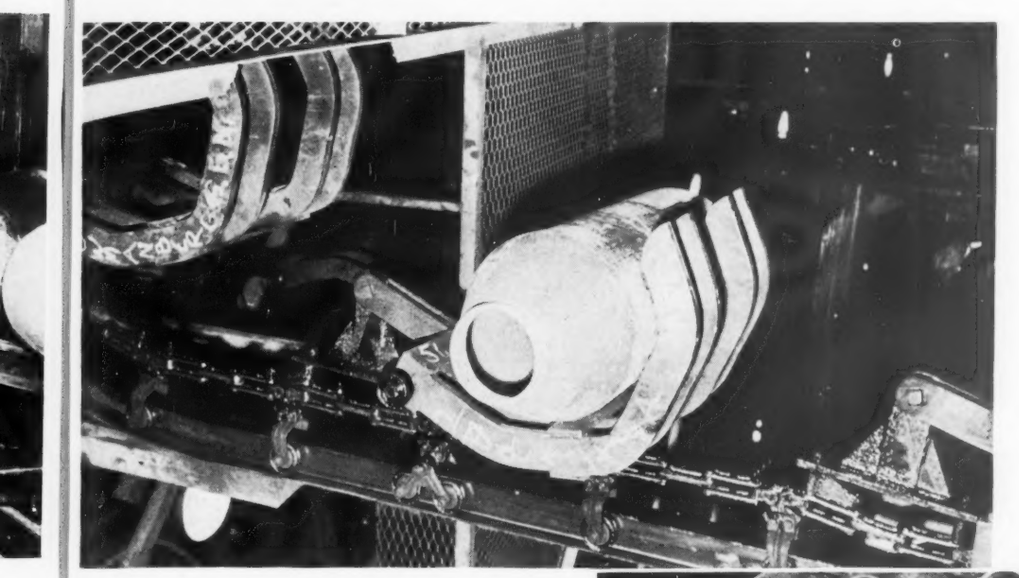
The plan suggests a method whereby the Army and Navy will purchase sundry items from small business through a board, or Small Business Department.

The method of establishing and operating the board could be as follows: Allocate funds to establish a small business purchasing department, appoint an emergency purchasing officer with power to purchase sundry items for the Army and Navy from small business on a cost plus basis or at a predetermined price.

A clearer function of the SBD is to purchase for the Army and Navy a portion of their requirements from small business on a basis where costs will not be more than for identical or similar items on the last invoice from any regular source.

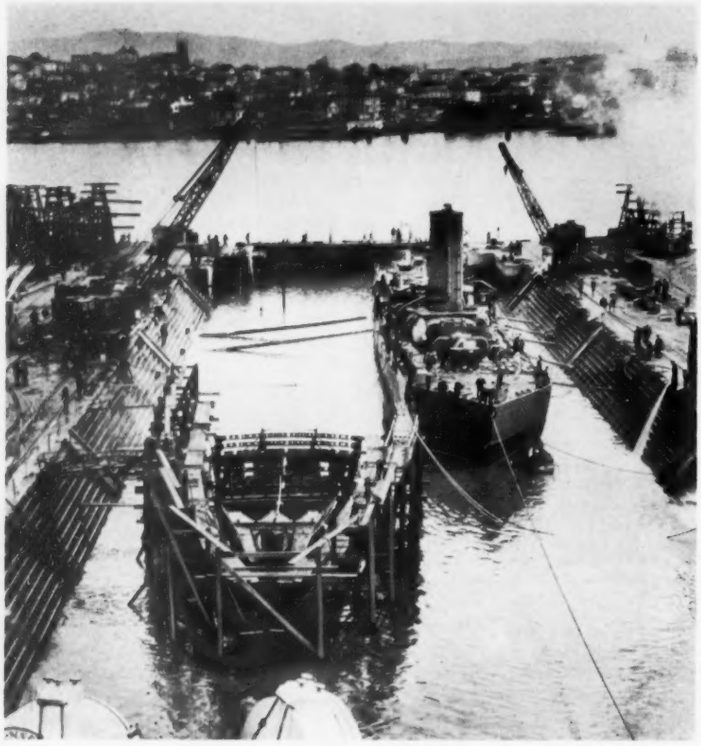
SBD shall adjust the small business price to the Army and Navy from the allocated fund for their department, either adding to or subtracting from the account. Army and Navy departments should freely purchase from SBD because of convenience and guarantee of correct price. It is hoped and suggested that the SBD will be able to operate on a no-cost basis.

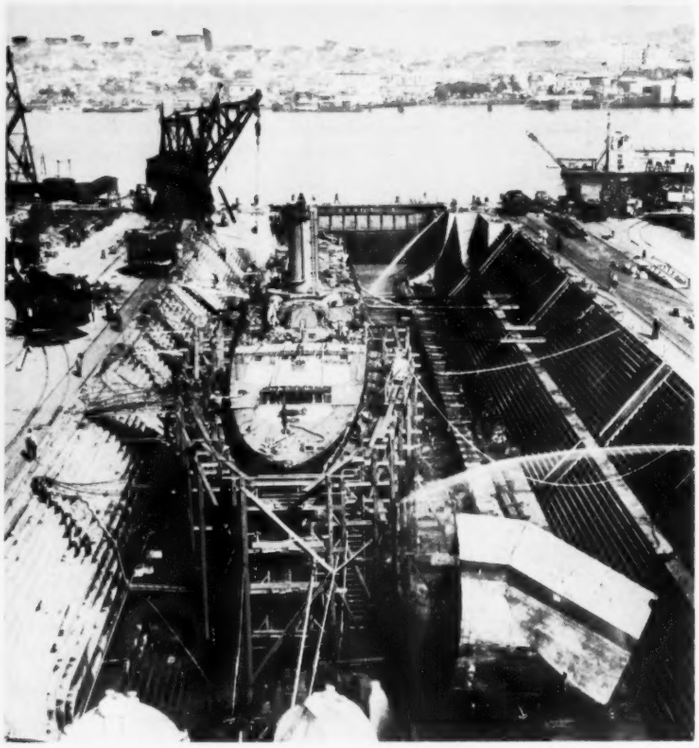
A suggested method would be to establish a master office, then regional offices. The main office obtains a list and number of items that are needed. Regional offices are notified, purchase orders made



Below, a corner of a huge "bank" of 500-pound demolition bomb bodies ready for attachment of shipping bands. At the lower left is one of the bodies in reversed position to show the "business end" to which the fuse subsequently will be attached at the small bottleneck. Note how this fuse end—shown as a flat base in top photo, opposite page, has been finish drawn to semispherical shape, necked and pierced

Above, conveyor systems similar to those of the automobile industry are used to hasten production. Here one of the 500-pound bomb bodies, with "necking-in" completed and loading opening machined, is being lifted in its special cradle from the heat-treating department to a department in which certain finishing operations are performed





AN interesting operation on the destroyer U. S. S. SHAW is illustrated in these photos released last week by the Navy department. The SHAW was badly damaged by a Jap bomb in Pearl Harbor, Dec. 7. In Honolulu a temporary bow was fitted in place of one blown off, and the destroyer steamed for a Pacific coast navy yard. There, in the meantime, a permanent bow was built up. Photo at the left shows this structure, and the SHAW with its temporary section, in dry dock. Right, after the new nose was grafted on, and the emergency one discarded

out and it is up to the regional office to find someone to make the items.

Purchase orders carry a price regulation prohibiting more than a certain per cent of profit where the manufacturer wishes a guarantee of cost plus. However, any small business man may be excused from cost plus provided he offers a guaranteed price.

To any small business which employs or can employ 24 or more on one shift, the SBD will send a bookkeeper, engineer and commonsense inspector. Their salaries will be paid by SBD and charged against the cost of the product. After costs have been arrived at, the owner of the plant may dismiss the SBD people provided he makes an agreeable guaranteed unit price for his products.

These men are sent into factories only in the capacity as inspectors and observers to discover the cost on the particular item, and notice if operations and management seem to be working for or toward honest efficiency.

The SBD shall employ as many practical engineers or practical men with specific or general factory supervisory experience as will be necessary. Relationship between factory owner and inspector shall be co-operative, with the owner having complete managing power; except the government bookkeeper and inspector shall set up a uniform SBD record system so that all SBD auditors will be working with the same accounting system.

The engineering department of SBD shall be available and offered freely to any small business which needs help and advice; however, their time should be charged against the cost of the merchandise produced.

In the SBD branch offices will be a department for concerns that employ less than 25 men and business will be allocated to them on small run jobs.

The idea back of this project is not to save small businesses, but to utilize their services and benefit America first and small business second.

In a year, one engineer could possibly serve 50 factories, so his cost compared with benefits is infiinitesimal. The cost of operating SBD offices would be nothing compared with the millions of dollars made by large manufacturing companies which operate on bid basis with the Army and Navy.

Sees Purchasing Power Above Available Goods

With national income for fiscal year 1943 estimated at 110 billion dollars and only about 56 billion dollars worth of civilian goods available, much of the added income must be directed into construction channels to avoid inflation, according to the First National Bank of Boston.

The bank estimates the distribution of national income for the year ending June 30, 1943, as follows: Civilian goods, $56,000,000,000; federal taxes, $27,000,000,000; allowance for increase in cost of living, $7,000,000,000; surplus funds available for defense bonds, new taxes, savings and debt reduction, $20,000,000,000.

February Gear Sales 22.5 Per Cent Over January

Gear sales to industry in February were 22.5 per cent above January, and 34.7 per cent over February, 1941, according to the American Gear Manufacturers Association, Wilkinsburg, Pa.

Index of sales, based on 1928 as 100, was 353 in February. This compares with 288 in January and 262 in February, 1941. Compilation applies only to industrial gears.

Carnegie To Wreck Old Stacks for Spare Parts

Carnegie-Illinois Steel Corp., Pittsburgh, is dismantling two old and inoperable blast furnace stacks in the Pittsburgh district. Essential parts will be utilized to increase capacity of other furnaces in the district by about 400,000 tons of iron.

Use of these parts and auxiliaries, such as blowers and casings, will conserve new equipment and will speed expansion which otherwise might have to await extended deliveries of new materials.

The *BUSINESS TREND*

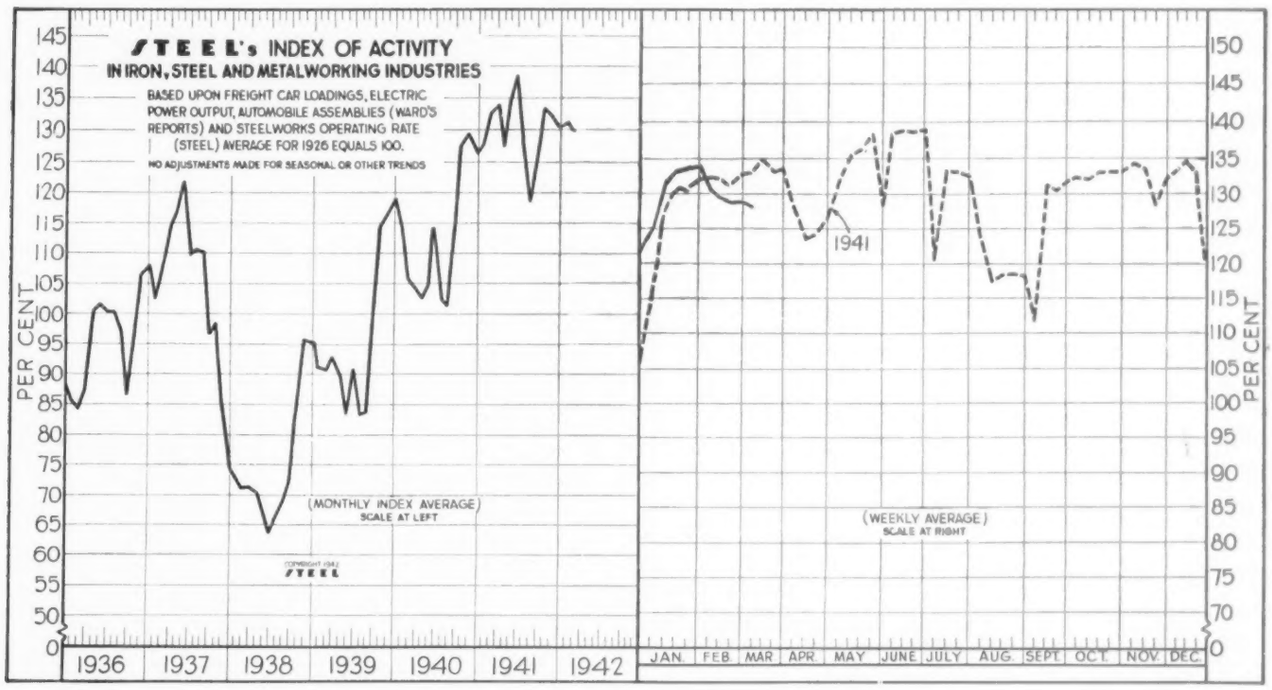
War Goods Output Offsets Decline in Consumer Lines

INDUSTRIAL production continues to expand despite the sharp contraction in consumer durable goods lines. Upturn in output of war materials has offset the decline in restricted manufacturing industries such as building construction, automobiles, refrigerators, washing machines, vacuum cleaners, furniture and radios.

The Federal Reserve Board's index of industrial production, adjusted to take into consideration the expansion in war industries, again advanced last month. In February the index reached an all-time peak of 173, up 2 points from the January index figure and compares with 141 recorded in February, 1941. During May, 1940, the beginning of the national defense program, the index stood at 116.

Ingot production is currently at peak levels, although on a percentage of capacity basis it is below a year ago. Revenue freight carloadings turned slightly downward during the latest period, while electric power consumption eased to 3,392,121,000 kilowatts.

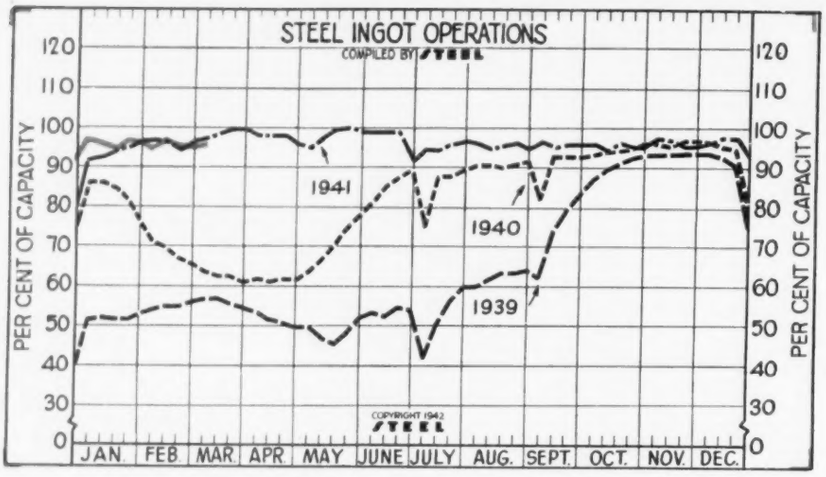
STEEL's index of activity in the iron, steel and metalworking industries declined 0.8 point to 128.3 during the week ended March 7.


STEEL's INDEX OF ACTIVITY
IN IRON, STEEL AND METALWORKING INDUSTRIES
BASED UPON FREIGHT CAR LOADINGS, ELECTRIC POWER OUTPUT, AUTOMOBILE ASSEMBLIES (WARD'S REPORTS) AND STEELWORKS OPERATING RATE (STEEL) AVERAGE FOR 1926 EQUALS 100.
NO ADJUSTMENTS MADE FOR SEASONAL OR OTHER TRENDS
PER CENT
(MONTHLY INDEX AVERAGE) SCALE AT LEFT
1936 1937 1938 1939 1940 1941 1942
1941
(WEEKLY AVERAGE) SCALE AT RIGHT
JAN. FEB. MAR. APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC.

STEEL'S index of activity declined 0.8 points to 128.3 in the week ended March 7:

Week Ended	1942	1941
Dec. 27	120.5	107.5
Jan. 3	124.7	114.5
Jan. 10	131.2	128.2
Jan. 17	133.1	130.8
Jan. 24	133.7	130.7
Jan. 31	133.9	132.0
Feb. 7	130.6	132.7
Feb. 14	129.8	132.3
Feb. 21	129.0	131.2
Feb. 28	129.1	133.0
Mar. 7	128.3	133.1

Mo. Data	1942	1941	1940	1939	1938	1937	1936	1935	1934	1933	1932	1931
Jan.	131.3	127.3	114.7	91.1	73.3	102.9	85.9	74.2	58.8	48.6	54.6	69.1
Feb.	129.6	132.3	105.8	90.8	71.1	106.8	84.3	82.0	73.9	48.2	55.3	75.5
March	.....	133.9	104.1	92.6	71.2	114.4	87.7	83.1	78.9	44.5	54.2	80.4
April	.....	127.2	102.7	89.8	70.8	116.6	100.8	85.0	83.6	52.4	52.8	81.0
May	.....	134.8	104.6	83.4	67.4	121.7	101.8	81.8	83.7	63.5	54.8	78.6
June	.....	138.7	114.1	90.9	63.4	109.9	100.3	77.4	80.6	70.3	51.4	72.1
July	.....	128.7	102.4	83.5	66.2	110.4	100.1	75.3	63.7	77.1	47.1	67.3
Aug.	.....	118.1	101.1	83.9	68.7	110.0	97.1	76.7	63.0	74.1	45.0	67.4
Sept.	.....	126.4	113.5	98.0	72.5	96.8	86.7	69.7	56.9	68.0	46.5	64.3
Oct.	.....	133.1	127.8	114.9	83.6	98.1	94.8	77.0	56.4	63.1	48.4	59.2
Nov.	.....	132.2	129.5	116.2	95.9	84.1	106.4	88.1	54.9	52.8	47.5	54.4
Dec.	.....	130.2	126.3	118.9	95.1	74.7	107.6	88.2	58.9	54.0	46.2	51.3



Steel Ingot Operations

(Per Cent)

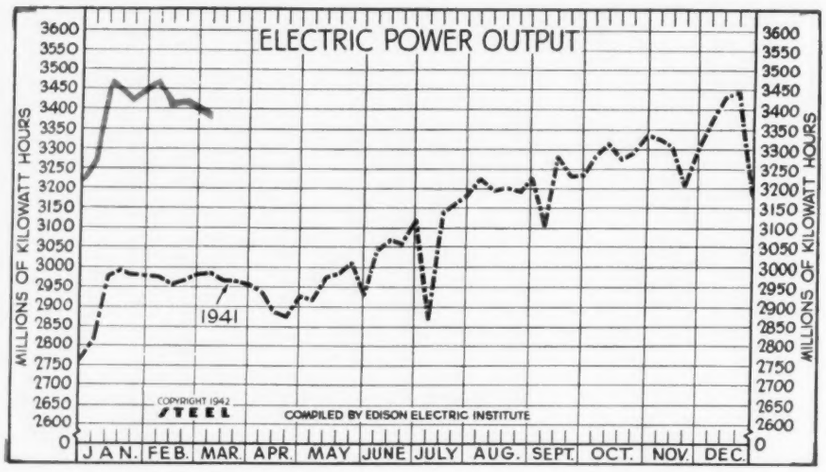
Week ended	1942	1941	1940	1939
March 7	96.5	97.5	63.5	56.5
Feb. 28	96.0	96.5	65.5	56.0
Feb. 21	96.0†	94.5	67.0	55.0
Feb. 14	97.0	96.5	69.0	55.0
Feb. 7	96.0	97.0	71.0	54.0
Jan. 31	97.0	97.0	76.5	53.0
Jan. 24	97.0	95.5	81.5	51.5
Jan. 17	96.0	94.5	84.5	51.5
Jan. 10	96.5	93.0	86.0	52.0
Jan. 3	97.5	92.5	86.5	51.5
Week ended	**1941**	**1940**	**1939**	**1938**
Dec. 27	93.5	80.0	75.5	40.0
Dec. 20	97.5	95.0	90.5	52.0
Dec. 13	97.1	95.5	92.5	58.0
Dec. 6	96.5	96.5	94.0	61.0

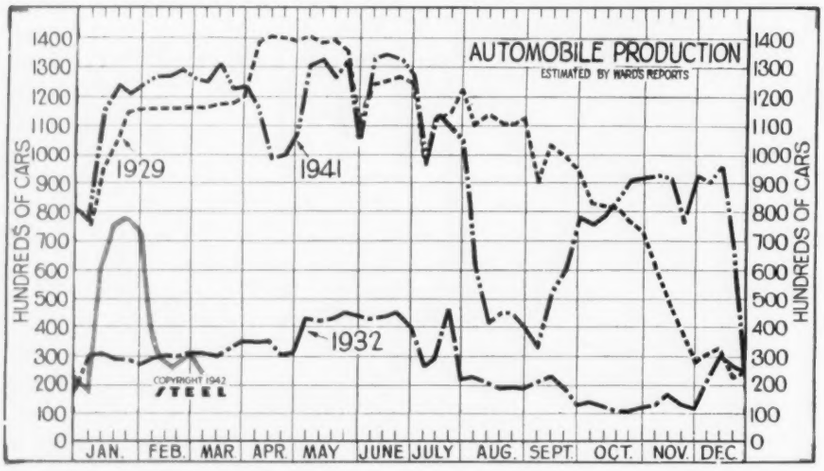
†Since Feb. 21 rate is based on new capacity figures as of Dec. 31 last.

Electric Power Output

(Million KWH)

Week ended	1942	1941	1940	1939
March 7	3,392	2,987	2,553	2,285
Feb. 28	3,410	2,982	2,568	2,294
Feb. 21	3,424	2,968	2,547	2,269
Feb. 14	3,422	2,959	2,565	2,297
Feb. 7	3,475	2,973	2,616	2,315
Jan. 31	2,468	2,978	2,633	2,327
Jan. 24	3,440	2,980	2,661	2,340
Jan. 17	3,450	2,996	2,674	2,342
Jan. 10	3,473	2,985	2,688	2,329
Jan. 3	3,287	2,831	2,558	2,239
Week ended	**1941**	**1940**	**1939**	**1938**
Dec. 27	3,234	2,757	2,465	2,175
Dec. 20	3,449	3,052	2,712	2,425
Dec. 13	3,431	3,004	2,674	2,390
Dec. 6	3,369	2,976	2,654	2,377
Nov. 29	3,295	2,932	2,605	2,335
Nov. 22	3,205	2,839	2,561	2,248


ELECTRIC POWER OUTPUT
MILLIONS OF KILOWATT HOURS
1941
COPYRIGHT 1942 STEEL
COMPILED BY EDISON ELECTRIC INSTITUTE
JAN. FEB. MAR. APR. MAY JUNE JULY AUG. SEPT. OCT. NOV. DEC.



Auto Production

(1000 Units)

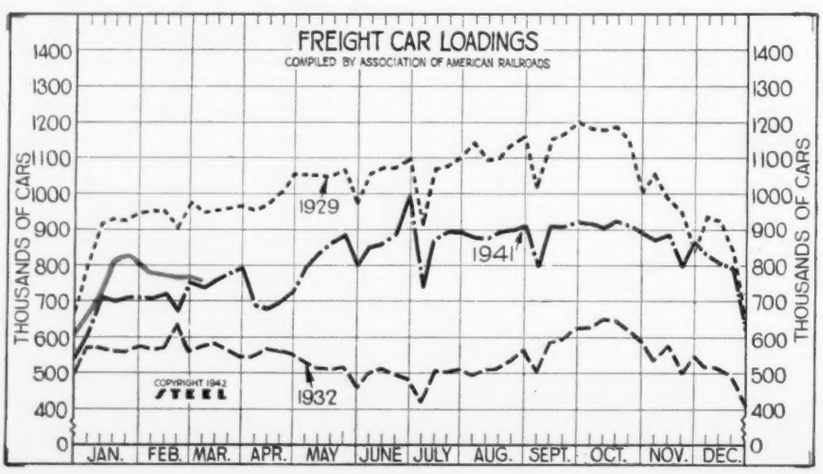
Week ended	1942	1941	1940	1939
March 7	24.5	125.9	103.6	84.1
Feb. 28	30.1	126.6	100.9	78.7
Feb. 21	25.7†	129.2	102.7	75.7
Feb. 14	29.8	127.5	95.1	79.9
Feb. 7	37.1	127.7	96.0	84.5
Jan. 31	73.3	124.4	101.2	79.4
Jan. 24	79.9	121.9	106.4	89.2
Jan. 17	75.0	124.0	108.5	90.2
Jan. 10	59.0	115.9	111.3	86.9
Jan. 3	18.5	76.7	87.5	76.7
Week ended	**1941**	**1940**	**1939**	**1938**
Dec. 27	24.6	81.3	89.4	75.2
Dec. 20	65.9	125.4	117.7	92.9
Dec. 13	96.0	125.6	118.4	102.9
Dec. 6	90.2	124.8	115.5	100.7
Nov. 29	93.5	128.8	93.6	97.8

†Canadian trucks and automobiles and United States trucks, since Feb. 21.

Freight Car Loadings

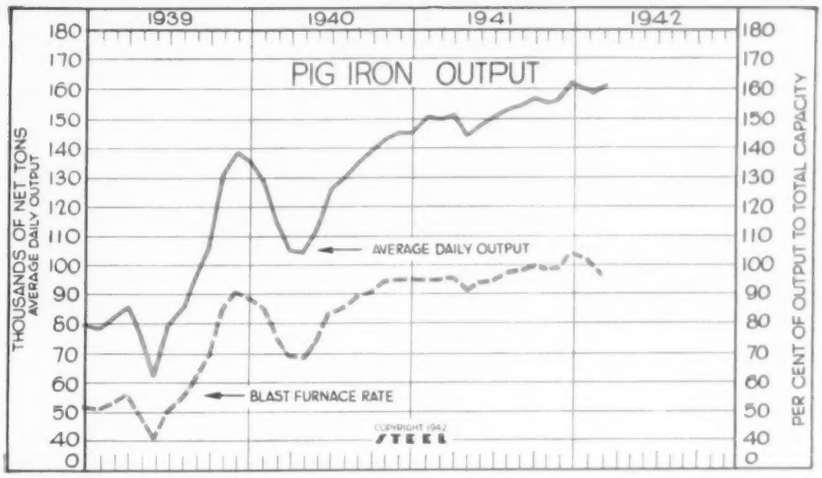
(1000 Cars)

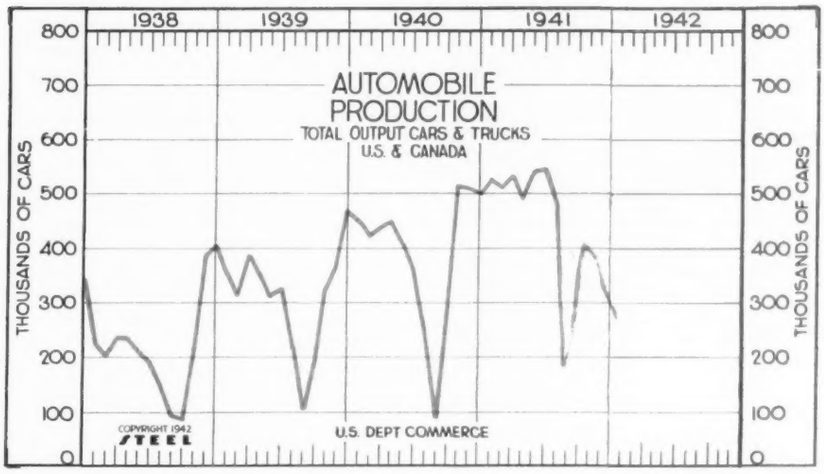
Week ended	1942	1941	1940	1939
Mar. 7	771	742	621	592
Feb. 28	781	757	634	599
Feb. 21	775	678	595	561
Feb. 14	783	721	608	580
Feb. 7	784	710	627	580
Jan. 31	816	714	657	577
Jan. 24	818	711	649	594
Jan. 17	811	703	646	590
Jan. 10	737	712	668	587
Jan. 3	674	614	592	531
Week ended	**1941**	**1940**	**1939**	**1938**
Dec. 27	607	545	550	500
Dec. 20	799	700	655	574
Dec. 13	807	736	681	606
Dec. 6	833	738	687	619



Pig Iron Production

	Daily average (000 omitted) —Net Tons—			Blast furnace —Rate (%)—		
	1942	1941	1940	1942	1941	1940
Jan.	160.0	150.5	129.8	102.9	95.5	85.4
Feb.	160.9	150.2	113.9	97.2	95.3	75.0
Mar.	.....	151.7	105.5	.....	96.3	69.5
Apr.	.....	144.7	104.6	.....	91.8	68.9
May	.....	148.3	112.8	.....	94.1	74.2
June	.....	151.7	127.1	.....	95.7	83.6
July	.....	153.7	131.0	.....	97.0	86.1
Aug.	.....	154.3	136.6	.....	97.4	89.9
Sept.	.....	157.4	139.1	.....	99.3	91.5
Oct.	.....	156.8	143.2	.....	98.9	94.2
Nov.	.....	156.9	146.6	.....	99.0	96.4
Dec.	.....	161.8	146.5	.....	104.1	96.4
Ave.	.....	153.2	128.1	.....	97.0	84.3





Automobile Production

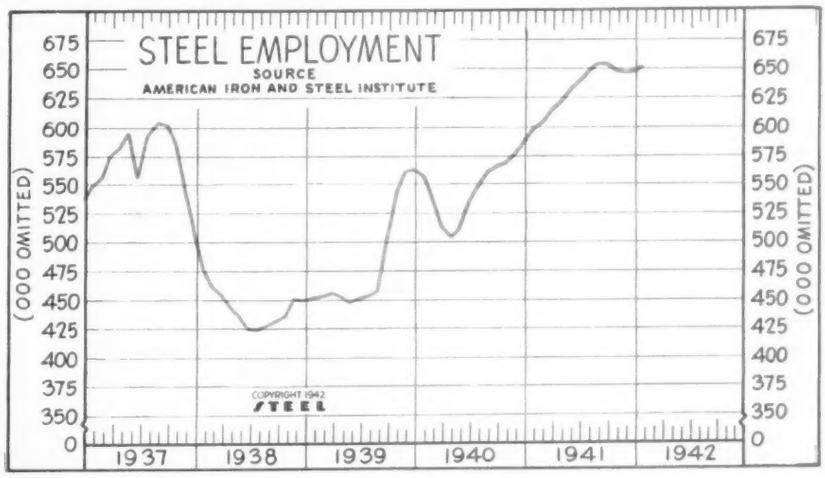
(Unit: 1000 Cars)

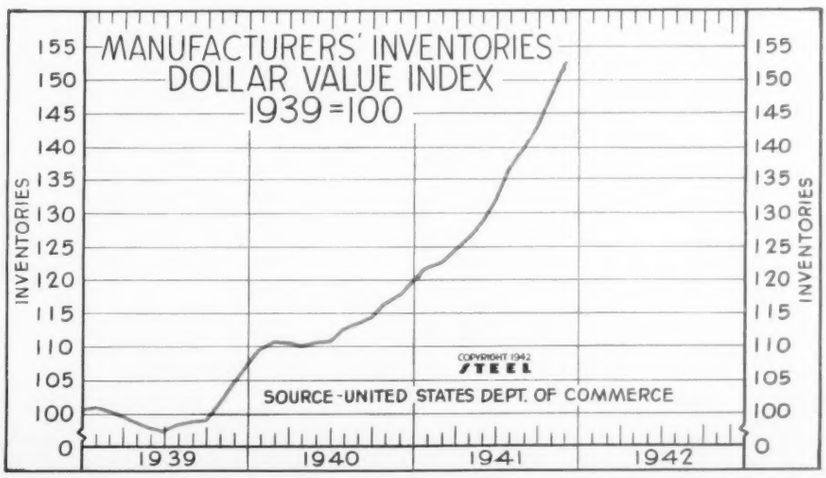
	1942	1941	1940	1939	1938
Jan.	260.1	524.1	449.3	357.0	227.1
Feb.	.....	509.3	421.8	317.5	202.6
March	.....	533.9	440.2	389.5	238.6
April	.....	489.8	452.4	354.3	238.1
May	.....	545.3	412.5	313.2	210.2
June	.....	546.3	362.6	324.2	189.4
July	.....	468.8	246.2	218.5	150.4
Aug.	.....	164.8	89.9	103.3	96.9
Sept.	.....	248.8	284.6	192.7	89.6
Oct.	.....	401.4	514.4	323.0	215.3
Nov.	.....	373.9	511.0	370.2	390.4
Dec.	.....	302.5	506.9	469.0	407.0
Ave.	.....	.....	391.0	311.0	221.3

Steel Employment

(000 omitted)

	1942	1941	1940	1939	1938
Jan.	651	598	556	451	475
Feb.	...	603	538	453	461
Mar.	...	613	514	455	455
Apr.	...	621	503	452	445
May	...	632	510	448	436
June	...	638	535	451	425
July	...	648	549	453	424
Aug.	...	654	560	458	427
Sept.	...	652	565	502	431
Oct.	...	646	568	545	436
Nov.	...	645	577	561	450
Dec.	...	646	585	563	449





Manufacturers' Inventories

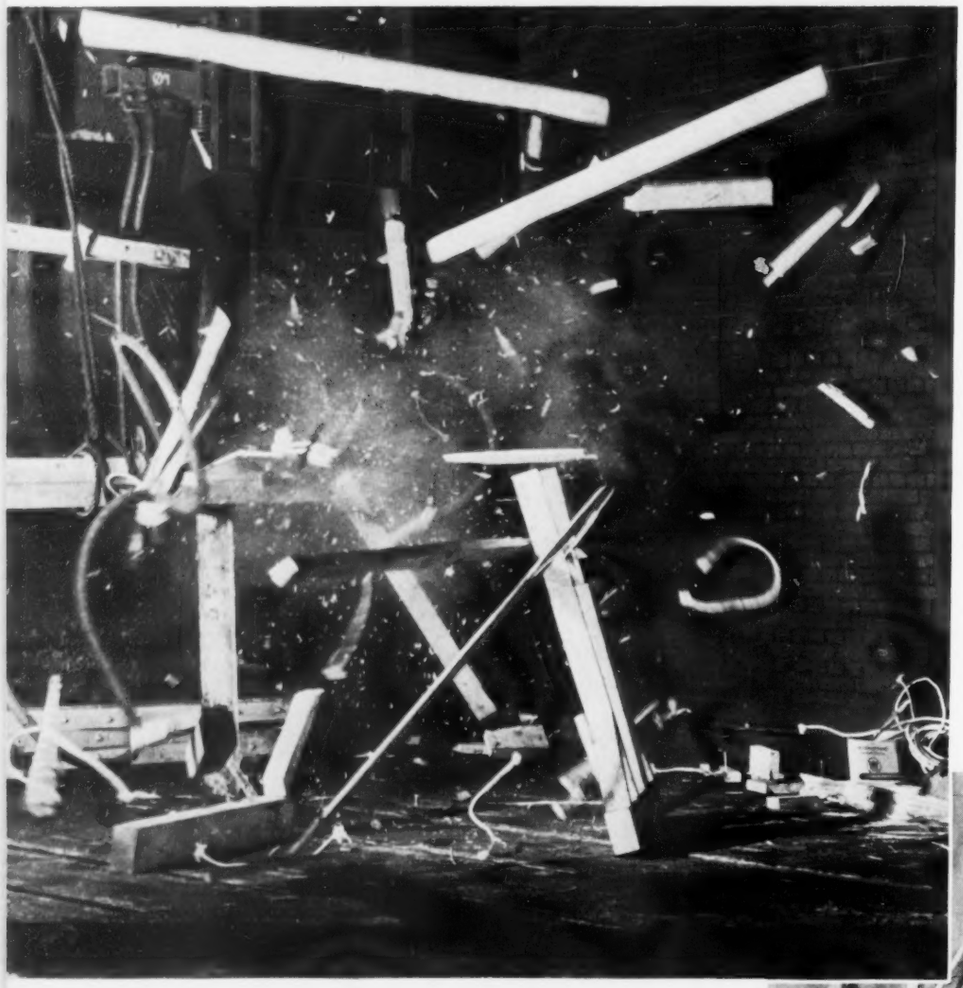
Dollar Value Index

1939 = 100

	1942	1941	1940	1939
Jan.	.....	121.8	109.5	100.9
Feb.	.....	122.7	110.6	100.4
March	.....	124.1	110.5	99.5
April	.....	126.0	110.0	98.5
May	.....	128.7	110.5	97.9
June	.....	132.0	110.6	97.4
July	.....	136.4	112.2	98.1
Aug.	.....	140.0	113.3	98.8
Sept.	.....	143.4	114.1	98.9
Oct.	.....	148.3	116.2	101.3
Nov.	.....	152.7	117.7	104.5
Dec.	.....	.....	119.9	107.2
Mo. Ave.	.....	.....	113.0	100.3

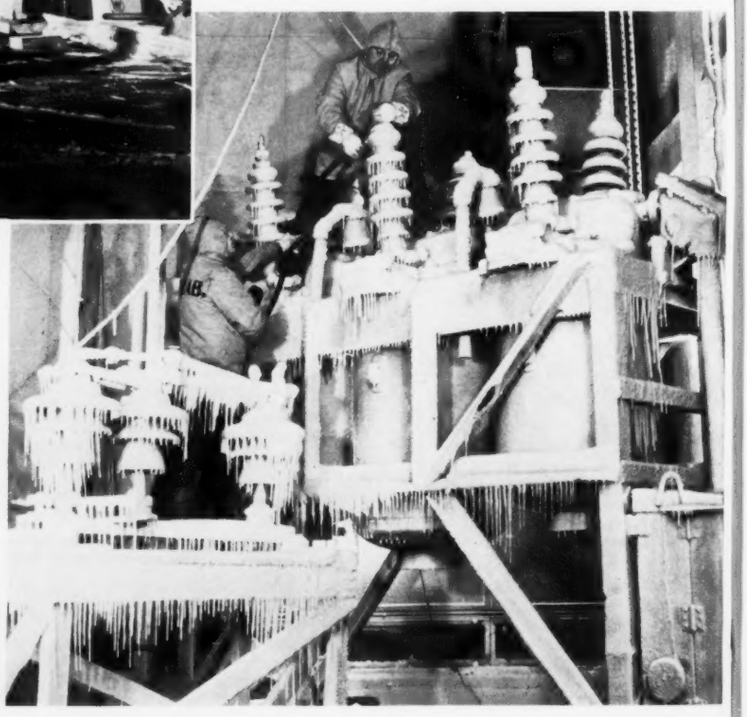
HIGH-POWER TEST

. . . . to guard against interruption of power to ordnance producers of the Nation



Smashed to smithereens!! This is what can happen when 60,000 amperes are fed through three cables tied together and reinforced with boards. The cables repel each other magnetically and separate due to the explosive force of 1,500,000 kilowatts

Directly below, icicles form rapidly on this circuit breaker being prepared for test in the refrigerated cell of the Westinghouse high-power laboratory. Refrigeration is accomplished by continually recirculating the inside air through the coils of an ammonia evaporator



Left, brains of the high-power laboratory is this central control desk, so arranged that a single operator can guide all high-power testing facilities. Included are the necessary indicating instruments, protecting relays, annunciators and test jacks for checking all measuring and control circuits

TING

DESIGN of equipment to control high power concentrations such as those being developed by western and southern power projects is greatly facilitated by a new high-power testing laboratory recently completed by Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

Facilities are now available for testing short circuits of 2,000,000 kilovolt-amperes at voltages exceeding any present or projected transmission voltages. The laboratory is in effect a power station delivering a momentary output comparable to the output of the great power stations such as that at Grand Coulee. Test voltages have been raised to 345,000 volts, 3-phase; 396,000 volts, single-phase.

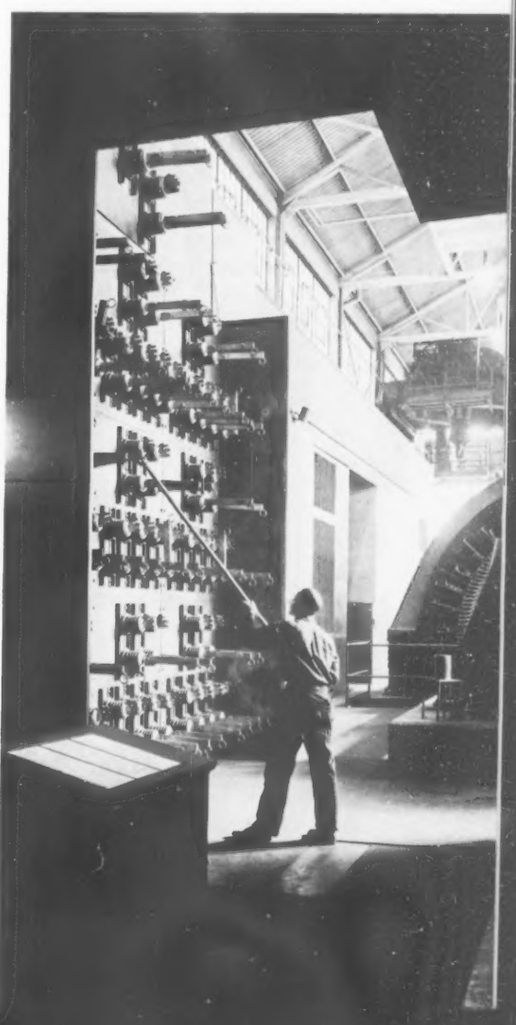
The significance of this development to industry is that it provides facilities for testing these high-power handling devices without actually interrupting power service from major generating stations. Thus circuit breakers can be developed which will be sure to operate correctly and with a reasonable safety factor should short circuits develop in these large power stations, guaranteeing that the short circuits will cause no damage to equipment and no interruption of power to war plants served by the affected power station.

The laboratory is felt adequate for the future demands of United States power system practice, and for the present, at least, its maximum capacity is necessary for very few installations. However, these installations, because they are the largest in the world, serve the largest amount of industrial demand so that all possible precautions must be taken to prevent interruption of service. High-speed interruption, high-speed reclosing, and repetitive duty of high powers have been major design problems. They require continued activity, not only for existing power sources but for the larger units which are projected as part of this country's war effort.

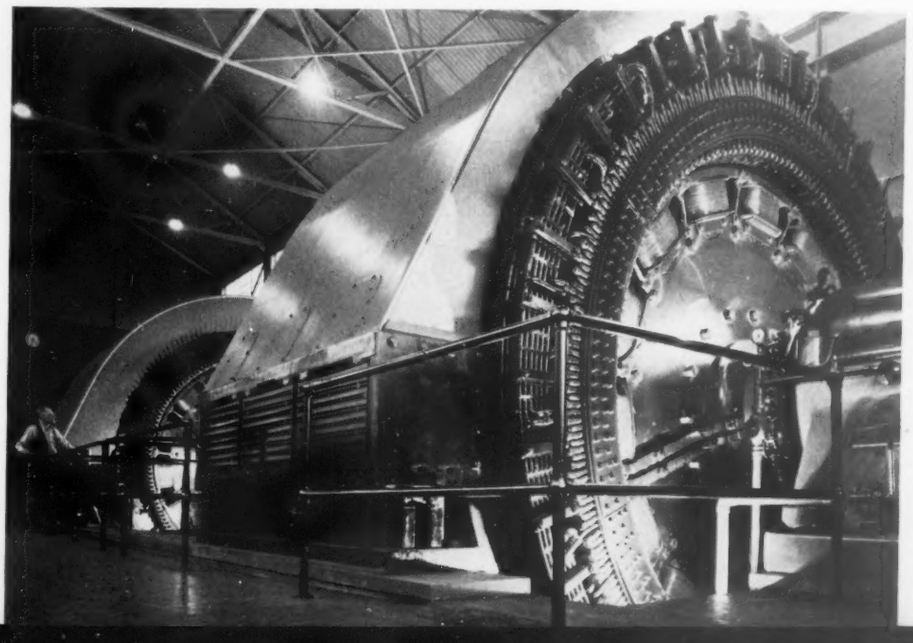
The laboratory is used to test many new developments at a wide range of voltages. Because of defense needs, the facilities are now determining interrupting ability of circuit breakers, resistance of porcelain insulators to power areas, performance of lighting arrestors, power transformers, reactors, bus bars, high-voltage capacitors and the like during short-circuit conditions.

Highlighting the test equipment in the new laboratory are two 60,000-kilovolt-ampere generator sets. These machines, when operating in parallel, can produce an initial 3-phase symmetrical short circuit of 2,200,000 kilovolt-amperes at 13.2 kilovolts. Second in importance is a transformer station that includes six 33,333-kilovolt-ampere single-phase transformers to provide momentary and 5-second current-carrying tests, a refrigerated room for testing breakers at —20 degrees Fahr. and the necessary complement of controls and measuring equipment. The facilities are controlled from a centralized control desk located in a separate building. The arrangement permits a single operator to control the operation. An oscillograph records simultaneously voltages, amperes, arc energy, trip coil current, breaker travel, and pressures generated in the breaker tank.

Right, setting up current-limiting reactor switches for circuit-breaker tests in new Westinghouse high-power laboratory. About 100 reactor combinations are possible by opening and closing the switches connected to the reactor behind the switchboard. Reactance can be varied from 5 ohms per phase to zero in small steps. Part of one of the 60,000-kilovolt-ampere generators is in the background



Below, closeup of 12-foot rotor in one of the 60,000-kilovolt-ampere generators in the new Westinghouse high-power laboratory. With a peripheral speed of 22,000 feet per minute and a rotor inertia of 8,500,000 pound feet squared, it takes two hours for the rotor to come to a standstill if no braking is applied



By A. H. MILNES
Metallurgical Staff
Bristol Aeroplane Co. Ltd.
Bristol, England

AIRCRAFT

(Section VI in a Series on Forgings, Forging Methods and Forging Equipment)

(Concluded from Last Week)

THE CHILLING effect produced by the relatively cold dies on the hot metal at the point of contact during forging results in a definite resistance to flow which materially influences the resultant deformation of the metal, especially in open dies. Here again some difference in the effects produced by drop forging and pressing is apparent. In drop forging, as in all hammer work, the bottom die only is in continual contact with the metal, whereas both dies in pressing are in contact throughout the operation. This effect is illustrated in Fig. 6. It may be important with large forgings, but the effect is rarely of sufficient magnitude to influence the production of small aircraft forgings.

Die Material: The surface resistance between the hot metal and the die depends upon the area of contact and upon the shape of the impression. Surface resistance results in abrasion of the die by the hot metal and so enters into the choice of die block for any particular application. Thus in selecting a die block, factors to be considered include the size, shape, and weight of the forging to be produced and the type of material from which the forging is to be made. The type of equipment to be used for forging is also a factor.

Standard die blocks are available in various grades and tempers. Nickel-chromium-molybdenum steel die blocks in the oil-quenched and tempered condition are most favored and are definitely superior for drop forging dies since they combine maximum abrasion resistance with excellent resistance to shock. Vanadium is frequently added to give a fine-grained dense structure.

The choice of temper depends upon the conditions of operation, the harder tempers being used where abrasion resistance is of primary importance and the softer tempers being used to prevent checking of intricate dies with deep impressions. Cheaper die steels are nickel-chromium, chromium-molybdenum and plain carbon steels.

Die Design: The correct design and layout of dies is the most important preliminary to the production of good quality forgings. The correct choice of die block for hardness, resistance to impact, resistance to abrasion by hot metal, die breakage due to cracking, checking in deep impressions—all reflect on the life of the die as also do the finer points of die sinking such as correct draft angles, radii in corners, flash and gutters, parting line, etc. We shall not however concern ourselves here with the question of die design from the standpoint of die life but merely insofar as it affects the quality of the product.

One of the most important factors in the production of good quality forgings, whether large forgings such as those normally produced under the hydraulic press or drop forgings with which we are more directly concerned here, is the question of "forging reduction". By this is meant the relationship between the cross sectional area of the original ingot and the cross sectional area of the finished forging. In this connection it should be appreciated that large ingots are prone to show a pronounced dendritic structure, particularly with steels which have a long freezing range, and that no amount of forging will entirely eliminate this. For this reason it is often desirable to use small ingots with a moderate amount of subsequent reduction during forging. Generally speaking, a forging reduction of 8:1 is satisfactory for drop forgings.

How Much Reduction? The troubles associated with an insufficient amount of reduction from the ingot stage are lack of soundness and density; unsatisfactory structure due to insufficient breakdown of the original ingot structure; inferior distribution and dispersion of nonmetallic segregates which may be present; and inadequate grain flow. In arriving at the amount of reduction which can be considered adequate, a clear differentiation should be made between the amount of work done by rolling and that done by forging since the results obtained by the two processes are not identical. For instance, the original ingot structure is more easily removed by forging than by rolling; nonmetallic inclusions are broken up to a greater extent by forging; and superior grain refinement and increased density result from forging in a closed die. On the other hand, excessive work under a hammer tends to interfere with the fiber structure, and this can easily offset any of the advantages mentioned above.

The dangers of excessive reduc-

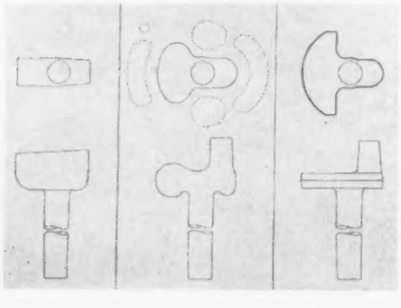
TABLE I—Chilling Effect of Dies on Upsetting, Showing Variation in Physical Properties with Direction of Testing

Direction	Yield Point Tons/Sq. In.	Max. Stress Tons/Sq. In.	Elongation Per Cent	Reductions of Area, Per Cent	Impact Ft. Lbs.
Longitudinal	43.0	51.0	23.5	61.0	64
20 degrees	43.0	51.0	23.1	59.0	64
40 degrees	43.0	51.0	23.5	58.0	45
60 degrees	43.0	51.0	16.5	28.0	27
80 degrees	43.0	51.0	15.0	26.0	18
Transverse	43.0	51.0	15.0	25.0	18

TABLE II—Effect of Forging Reduction on Physical Properties in Longitudinal and Transverse Directions

Forging Reduction A_1/A_b	Max. Stress in Tons/Sq. In.	Elongation Per Cent	Reduction of Area, Per Cent	Impact Ft. Lbs.
		Longitudinal		
1.7	58.0	20.0	52.0	49
3.2	58.0	20.0	58.5	59
6.1	57.5	22.0	63.0	72
		Transverse		
1.7	58.0	18.0	64.0	40
3.2	57.5	16.0	61.0	29
6.1	57.5	12.0	55.0	25

Fig. 5—Three steps in forging the front half of a built-up crankshaft



T DROP FORGINGS

tion are not so generally appreciated, but it has been shown that an undesirable structure with consequent adverse effects on the mechanical properties, particularly the transverse mechanical properties, can result from excessive reduction. No steel has yet been made which is completely homogeneous and this inevitable heterogeneity results in a variation in physical properties according to the direction in which the test piece is taken in relationship to the direction of forging. This difference is apparent in the inferior ductility in a direction transverse to forging as shown in Table I.

Directionality: The directional properties are closely related to the amount of deformation by forging. Thus the difference between the longitudinal and transverse properties increases as the amount of deformation due to forging increases. Table II shows results published by Charpy illustrating the effect of various forging-reduction ratios on the directional properties. From this it can be seen that while the longitudinal tests improve with extra reduction, the transverse tests deteriorate as far as ductility and resistance to shock are concerned. Therefore the amount of forging reduction is of considerable importance since certain minimum transverse properties are vital.

Effects of Excessive Reduction: This matter of excessive reduction and its detrimental effects on the properties in a transverse direction can be explained further by a consideration of the effect of nonmetallic inclusions. There is no doubt that the effect of forging on nonmetallic inclusions does result in a difference in toughness and ductility in the two directions. That the effect of inclusions on the directional properties is worthy of consideration is shown in Fig. 6.

Referring to Fig. 6 if a stress T is applied in the direction shown, the concentration of stress P along the line XX is given by the following formula:

$$P = T\left(1 + \frac{2b}{a}\right)$$

If $a = 20\ b$, then:

$$P = T\left(1 + \frac{2b}{20b}\right)$$

$$P = 1.1\ T$$

This represents the state of affairs around an inclusion when a *longitudinal* stress is applied and it is seen that the concentration of stress is negligible so far as the factor of safety is concerned. But consider the state of affairs when a *transverse* test is applied:

Again, $P = T\left(1 + \frac{2b}{a}\right)$

If $a = \frac{b}{20}$, then:

$$P = T\left(1 + \frac{40a}{a}\right)$$

$$P = 41\ T$$

Within the elastic limit, this is the situation around an inclusion when a transverse stress is applied. In this case the concentration of stress is considerable. Actually the ductility present in steel results in a reduction of this concentration of stress since the inclusion will tend to elongate in the direction of the pull, but it is not until the conditions approach these present when a longitudinal stress is applied that this becomes negligible.

It can be seen therefore that inclusions which have been elongated by forging are, to all intents and purposes, the equivalent of holes when their effect on the transverse properties is considered. The greater the reduction, the greater the extension of the inclusions in the direction of flow and the greater the effect on the transverse properties.

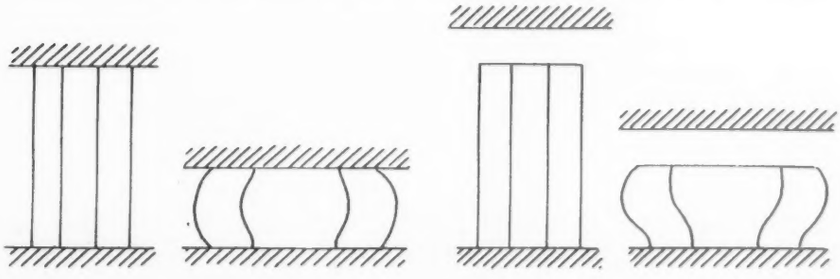
It is because of this difference in the directional properties that such pains are taken to produce correct grain flow in aircraft forgings. During rolling and forging, the original dendritic structure formed on casting is distorted in the direction of work. Since diffusion does not go on to completion, the segregates present take up a position which is dependent on the direction of plastic flow. The actual grain structure can be controlled by subsequent heat treatment, but the segregates remain drawn out in the direction of flow and so affect the directional properties of the forging.

Attention to flow direction is therefore of primary importance, and care should be taken to insure that the flow lines are not broken during forging and that the grain flow produced is such that subsequent machining will not cut the flow lines where such interference will affect the strength of the component. To get proper grain flow, the part is forged to shape in several stages, each stage changing the shape a certain amount. Fig. 5 shows the various stages in producing the front half section of a single row radial aircraft engine crankshaft and illustrates the precautions taken to maintain satisfactory grain flow. Also see dies in Part I of this presentation, STEEL, March 9, 1942, p. 64.

Temperature Control: A further important factor in the production of good quality forgings is the necessity for accurate temperature control during reheating, soaking and forging. A wide variety of furnaces are used including coal-fired, gas-fired and oil-fired units and careful control of the furnace atmosphere is necessary to avoid troubles such as hot shortness, excessive scaling, and the like. Batch furnaces are common and are generally suited to a variety of work, but the continuous pusher-type furnace is also suitable. Wherever possible, tempera-

(*Please turn to Page* 117)

Fig. 6—These two illustrations show difference in flow of metal in open dies caused by inertia and cooling effect of the dies. At left, the shape produced by forging in a hydraulic press at slow speeds. At right, the shape resulting from use of the hammer. Impact in the latter instance causes the metal to flow more at the top



Develops Antirust Oil For Metal Products

Besides having a high flash point, the new antirust oil, Miccroil, recently developed by Michigan Chrome & Chemical Co., 6340 East Jefferson avenue, Detroit, is said to dry in 30 to 45 minutes. Light in color and transparent, it does not alter the appearance of the part on which it is applied, it is reported.

The product contains no ingredients which produce a rancid odor. It is applied by hand dipping and is of a consistency which assures a uniform and effective protective film over the entire surface. It contains 42 5 per cent total solids. Once applied the oil, will provide constant protection until removed.

In a series of exposure tests, steel panels coated with this development were subjected to corrosive action of acid fumes in a plant where the relative humidity varied from 92 to 96 per cent at 87 degrees Fahr. At month's end no appreciable change could be seen. No deterioration was shown after 48 hours in a continuous spray of 20 per cent salt solution, with the relative humidity at 96 per cent and the temperature 80 degrees Fahr. Also no change could be noted after four weeks exposure to weather on a roof of a plant during the month of January.

Association Publishes New List of Standards

Nearly 500 standards are embodied in the new list recently published by the American Standards Association, 29 West Thirty-ninth street, New York, for 1942. These cover a wide variety of industrial fields, including both industrial and public safety.

The list carries all the defense emergency stendards under a separate heading—that is those developed specifically for defense purposes, and for the first time all of the safety standards are listed together in a separate section.

Standards include definitions of technical terms, specifications for metals and other materials, methods of test for finished product, dimensions, safety provisions for use of machinery and methods of work. In each case these standards represent general agreement on the part of the maker, seller and user groups as to the best current industrial practice.

The list is being offered free of charge to anyone requesting it. Requests should be directed to the association headquarters.

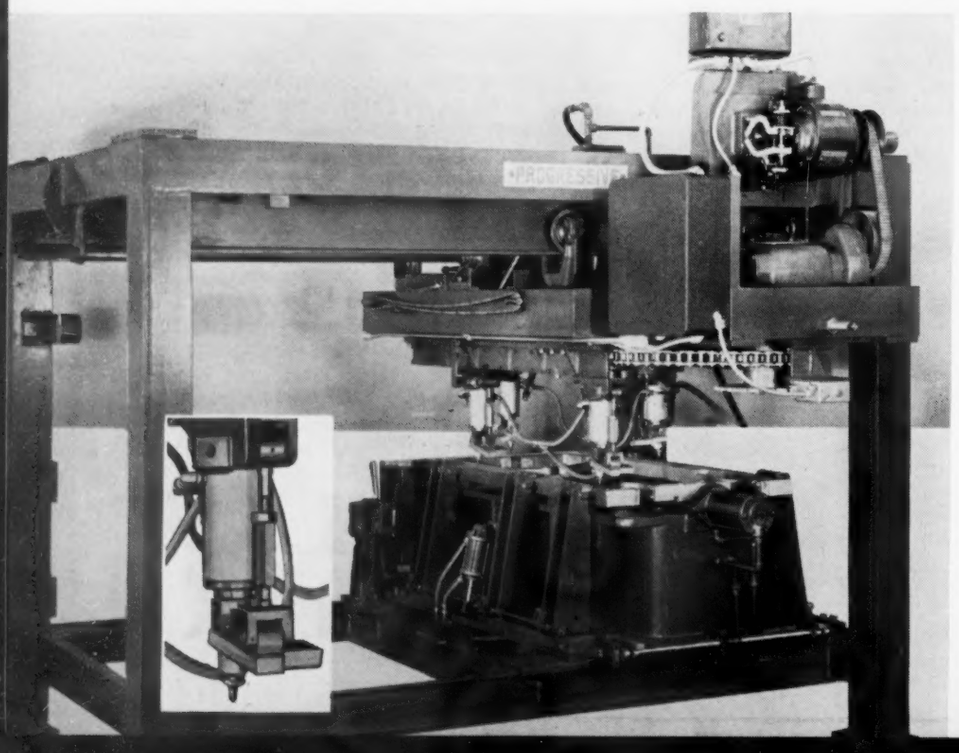
WELDING GUNS WALK

To Speed Operations

. RESISTANCE welds can now be made automatically in sequence on work held stationary in fixtures. By means of a unique knee action, welding guns developed by Progressive Welder Co., 3050 East Outer drive, Detroit, are made to "walk" along the work, making a series of spot welds as they go. The machine illustrated (with one of its two locating fixtures removed) joins the back panels to two sizes of refrigerator shells by this method—welding one assembly while another is being loaded and unloaded.

Shell and back panel are dropped over the locating fixture, which incorporates the copper shunt or backup bar. An air-operated clamping mechanism seen at the side of the fixture holds the panels in place. When a button is pressed, the entire operating head of the machine positions itself above the loaded fixture. Pushing another button starts the automatic welding operation:

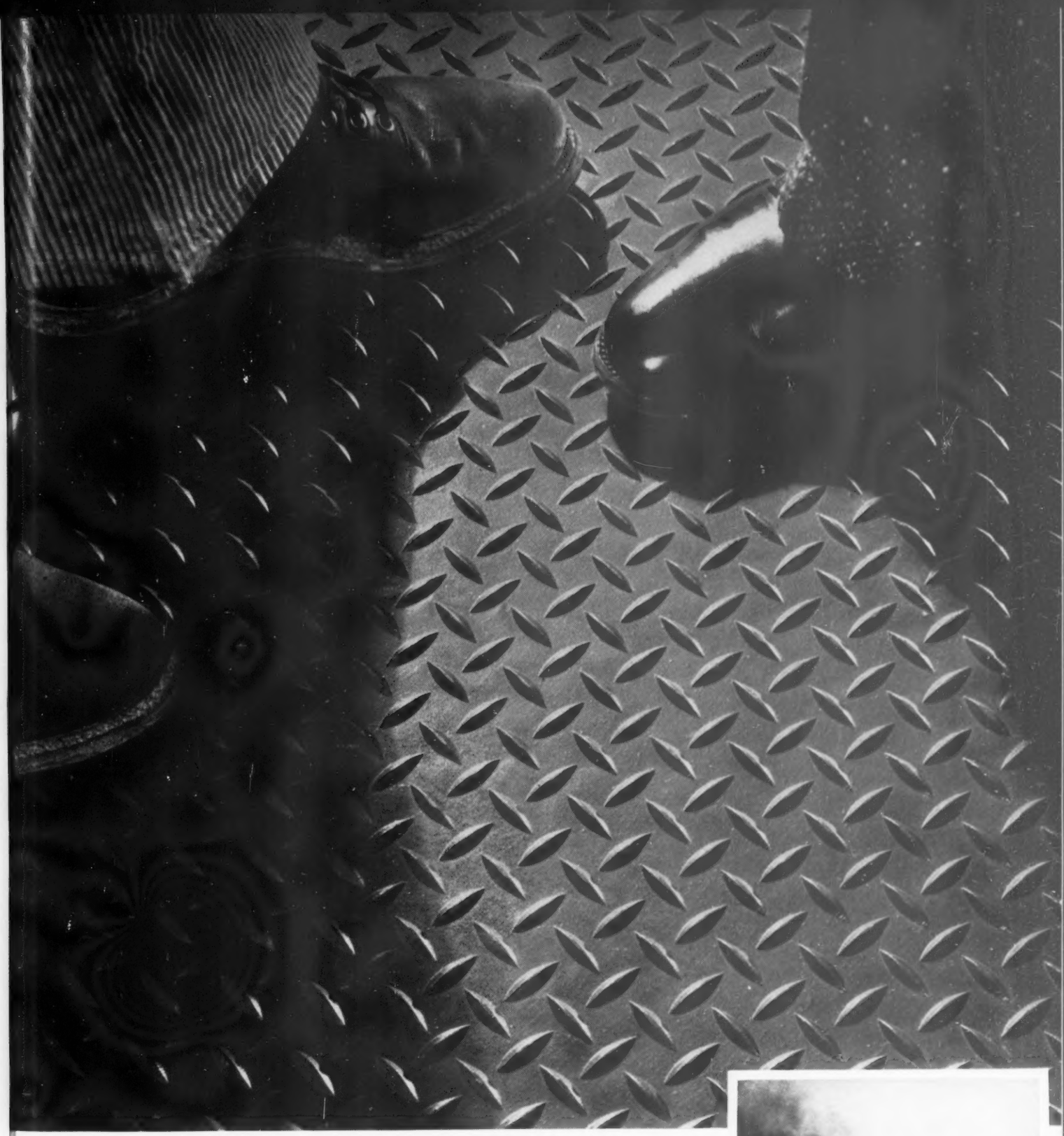
The four gun points come down and make four welds, pairs of guns welding in series. At the same time, the chain visible in the illustration starts to move. Its motion is continuous, carrying the heads of the welding guns along. The weld cycle is controlled by an electronic timer so when the weld is completed, the pressure is removed from the gun points and springs swing these points to a new position farther along (depending on the amount the chain has moved). Off-time between welds is controlled automatically by a notched timing disk to permit guns to move on to next spot before welding current comes on. Then another weld is made automatically and the guns take another step.



To complete one assembly in the setup shown, each gun takes 19 steps and makes 20 welds 1½ inches apart—a total of 80 per assembly. Time for the complete welding cycle is approximately 12 seconds. Note in the inset the parallelogram construction of the gun which permits the top of the gun to move while the electrode is stationary.

While one set of panels is being welded, the other fixture is being unloaded and reloaded. The machine operating head, which is mounted on wheels rolling on flanges of beams extending above the two fixtures, now moves over the second fixture and repeats the cycle, except that the movement of the guns is now in the opposite direction, the chain automatically reversing its direction of travel at the end of each complete cycle of welds.

Obviously this type of arrangement can be modified to handle an extremely wide range of spot welding operations.



When safety means so much . . . Around America's big guns and in plants fighting the battle of production, "A.W." Rolled Steel Floor Plate prevents costly slipping and falling accidents. Saves man hours when time is short. Every step is a safe step on "A.W." Floor Plate. Fire-proof, heat-proof, oil-proof, crack-proof. Easy to clean, quick to drain. No maintenance expense.

ALAN WOOD STEEL COMPANY

MAIN OFFICE AND MILLS: CONSHOHOCKEN, PA. District Offices and Representatives: Philadelphia, New York, Boston, Atlanta, Buffalo, Chicago, Cincinnati, Cleveland, Denver, Detroit, Houston, St. Paul, New Orleans, Pittsburgh, Roanoke, Sanford, N.C., St. Louis, Los Angeles, San Francisco, Seattle, Montreal.

Courtesy U. S. Army Signal Corps

WPB Issues . . .

EMERGENCY STEEL LIST

THE NEW war emergency alloy steel specifications announced March 5 by the Iron and Steel Branch, War Production Board, are incorporated in the two tables appearing herewith.

Table I contains those alloy steels which can be expected to continue to be obtainable.

Table II sets forth two to three possible alternate alloy compositions for each of the significant alloy steels heretofore in use.

Consumers are expected to use plain carbon steels if possible. If it is necessary for them to use alloy steels they should specify from Table I if possible. If necessary they may specify from Table II; the original composition may be specified if the material is obtainable, or, if the original composition is not available, one of the alternate specifications may be employed.

Many consumers already have redesigned parts in order to use other steels than they normally have been using. Others are expected to take similar action where this is possible.

The steels identified by the prefix "WD" are among those of the War Department; these particular steels have not been regarded as significant either by the American Iron and Steel Institute or by the Society of Automotive Engineers since they account for only a small amount of tonnage.

The original announcement of the action of the Iron and Steel Branch, War Production Board, appeared in STEEL of March 9, p. 39.

Table I— AVAILABLE STEELS

SAE or AISI Number	C	MN	NI	CR	MO
A 4027	.25-.30	.70- .90	.....	.....	.20-.30
A 4037	.35-.40	.75-1.00	.....	.....	.20-.30
A 4063	.60-.67	.75-1.00	.....	.....	.20-.30
A 4068	.64-.72	.75-1.00	.....	.....	.20-.30
NE 8024	.22-.28	1.00-1.30	.....	.....	.10-.20
NE 8124	.22-.28	1.30-1.60	.....	.....	.25-.35
NE 8233	.30-.36	1.30-1.60	.....	.....	.10-.20
NE 8245	.42-.49	1.30-1.60	.....	.....	.10-.20
NE 8339	.35-.42	1.30-1.60	.....	.....	.20-.30
NE 8442	.38-.45	1.30-1.60	.....	.....	.30-.40
NE 8447	.43-.50	1.30-1.60	.....	.....	.30-.40
NE 8547	.43-.50	1.30-1.60	.....	.....	.40-.60
NE 8620	.18-.23	.70- .95	.40-.60	.40-.60	.15-.25
NE 8630	.27-.33	.70- .95	.40-.60	.40-.60	.15-.25
NE 8724	.22-.28	.70- .95	.40-.60	.40-.60	.20-.30
NE 8739	.35-.42	.75-1.00	.40-.60	.40-.60	.20-.30
NE 8744	.40-.47	.75-1.00	.40-.60	.40-.60	.20-.30
NE 8749	.45-.52	.75-1.00	.40-.60	.40-.60	.20-.30
NE 8817	.15-.20	.70- .95	.40-.60	.40-.60	.30-.40
NE 8949	.45-.52	1.00-1.30	.40-.60	.40-.60	.30-.40

All of the above steels contain .20-.35 silicon and .040 maximum each sulphur and phosphorous. In addition to the above, the usual plain carbon (1000 series) high sulphur (1100 series), high phosphorous (1200 series), silico manganese (9200 series) steels are available in the various carbon ranges, as are, also, certain other carbon molybdenum (4000 series) steels.

Table II—STEEL SPECIFICATIONS

—STANDARD SERIES DESIGNATION— 1942 AISI Number	1941 AISI Number	1942 SAE Number	1941 SAE Number	POSSIBLE ALTERNATES —SAE or AISI Number—		
				Number	Number	Number
A 1320	A 1321	1320	....	A 4027	NE 8024	.....
A 1330	A 1330	1330	1330	A 4037	NE 8233	.....
A 1340	A 1340	1340	1340	A 4047	NE 8245	.....
A 2317	A 2317	2317	2315	A 4027	NE 8024	NE 8620
A 2330	A 2330	2330	2330	A 4037	NE 8233	NE 8630
A 2335	A 2335	...	....	A 4063	NE 8339	NE 8739
A 2340	A 2340	2340	2340	A 4068	NE 8442	NE 8744
A 2345	.....	2345	2345	A 4068	NE 8447	NE 8749
WD2350	.....	....	....	A 4068	NE 8547	NE 8949
A 2515	A 2514	2515	2515	A 4027	NE 8817	.....
A 3045	A 3045	....	....	A 4068	NE 8442	NE 8744
A 3120	A 3120	3120	3120	A 4027	NE 8024	NE 8620
A 3130	A 3130	3130	3130	A 4037	NE 8233	NE 8630
A 3135	A 3135	3135	3135	A 4063	NE 8339	NE 8739
A 3140	A 3140	3140	3140	A 4068	NE 8442	NE 8744
A 3141	A 3141	3141	X3140	A 4068	NE 8447	NE 8749
A 3145	A 3145	3145	3145	A 4068	NE 8447	NE 8749
A 3150	A 3150	3150	3150	A 4068	NE 8547	NE 8949
A 3240	A 3240	3240	3240	A 4068	NE 8442	NE 8744
WD3250	.....	....	....	A 4068	NE 8547	NE 8949
A 4119	A 4119	4119	.....	A 4027	NE 8024	.....
A 4130	A 4130	4130	X4130	A 4037	NE 8233	NE 8630
A 4137	A 4137	4137	...	A 4063	NE 8339	NE 8789
A 4142	A 4142	....	....	A 4063	NE 8442	NE 3744
A 4145	.....	4145	...	A 4068	NE 8477	NE 8749
A 4150	.....	4150	4150	A 4068	NE 8547	NE 8949
A 4320	A 4320	4320	4320	.....	NE 8124	NE 3724
A 4340	...	4340	X4340	A 4068	NE 8547	NE 8949
A 4620	A 4620	4620	4620	A 4027	NE 8024	NE 8620
A 4640	.....	4640	4640	A 4063	NE 8339	NE 8739
A 4645	.....	....	....	A 4068	NE 8447	NE 8744
4650	.....	....	....	A 4068	NE 8547	NE 8949
A 4820	A 4821	4820	4820	...	NE 3124	NE 8724
A 5045	A 5045	....	...	A 4063	NE 8339	.....
A 5120	A 5120	5120	5120	A 4027	NE 8024	.....
A 5130	A 5130	....	....	A 4037	NE 8233	.....
A 5140	.....	5140	5140	A 4063	NE 8339	.....
A 5145	A 5145	....	....	A 4068	NE 8442	.....
A 5150	A 5152	5150	5150	A 4068	NE 8447	.....
A 6120	A 6120	....	....	A 4027	8024	NE 8620
.....	....	6130	....	A 4037	NE 8233	NE 8630
WD6140	.....	....	....	A 4063	NE 8339	NE 8739
A 6145	.....	....	....	A 4068	NE 8442	NE 8744
A 6150	.....	6150	6150	A 4068	NE 8447	NE 8749

Text on Metal Layout For Air Conditioning

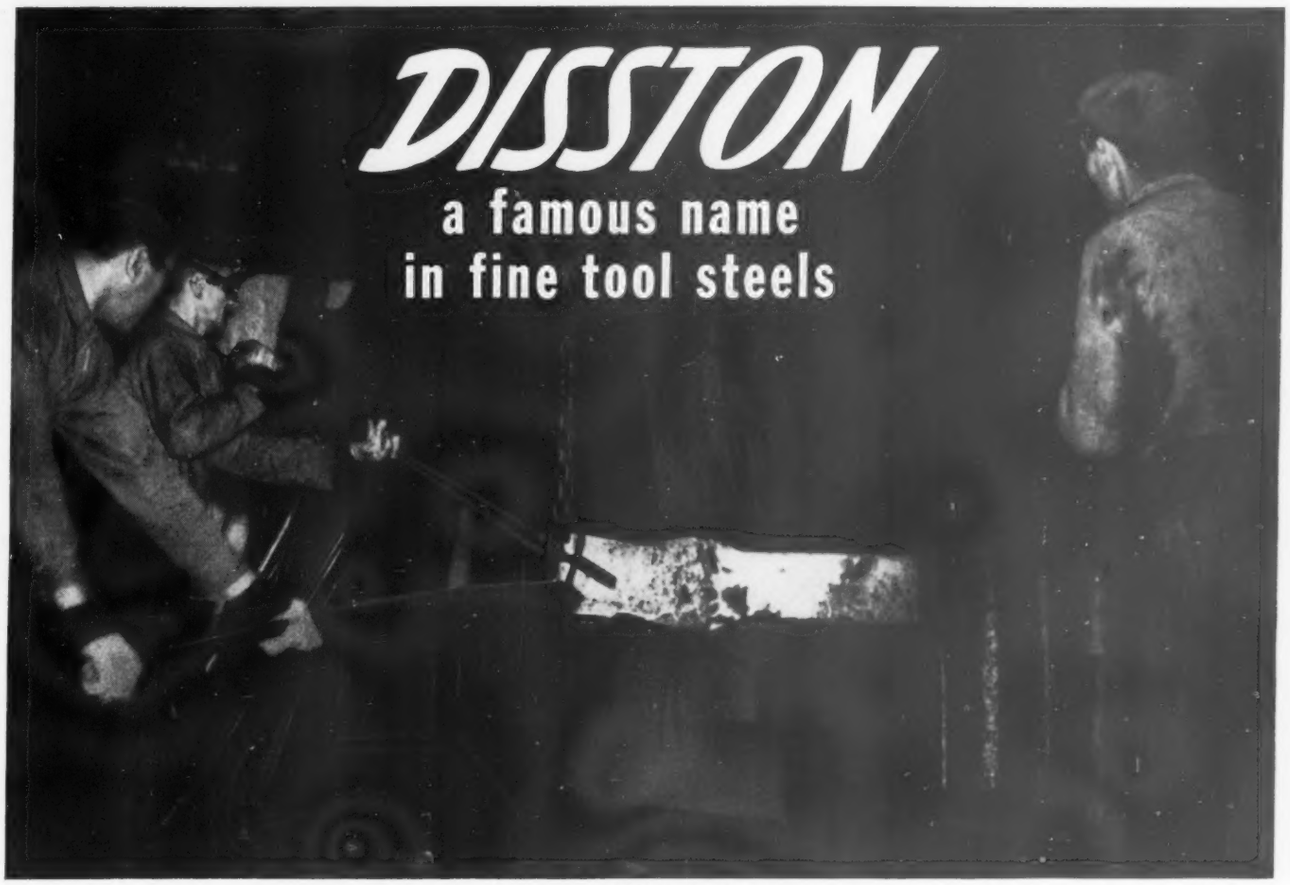
Air Conditioning Metal Layout, by Joseph J. Kaberlein; cloth, 308 pages, 6 x 9 inches; published by Bruce Publishing Co., Milwaukee, for $3.75.

This is a textbook and working guide, with practical and shortened methods for laying out and forming the patterns used in air conditioning, heating and ventilating, with mathematical formulas applied to sheet metal work.

It was prepared as a guide in these growing fields where demand is increasing for skilled layout men and pattern cutters. It has proved useful in vocational, trade, technical and high schools. Each problem is practical and adaptable and every fitting shown is being used in regular work.

Each problem is drawn to scale with dimensions ample for metal construction. Demonstrations are simplified by illustrations of all the patterns required. This allows the student to check each pattern before making a seam allowance.

The superintendent, foreman, draftsman and mechanic will find the book of value as a reference for the more complicated problems not of everyday occurrence.



All Disston ingots are hammer forged under a six-ton or three-ton steam cogging hammer.

Eighty-seven years of fine steel manufacture have created a background of experience, a tradition of quality, that are expressed today in superior Disston Tool Steels for many purposes.

In modern electric furnaces Disston uses only the purest materials and carefully segregated scrap, selected by expert metallurgists. Ingots are cast from shallow ladles into the smallest size mold that will give ideal reduction to finished rolled size.

Since accurate metallurgical and chemical controls permit operations within very close limits, many desirable special properties are developed in Disston Steels. Grain size can be predetermined and soundness and cleanliness maintained at extraordinary high levels. Thus it has been possible for Disston to produce such important tool steels as Croloy . . . highly resistant to both sliding and impinging wear, with good air hardening qualities . . . a superior tool steel for dies, punches and many high production tools.

At the service of the men who make tools: Disston engineers and metallurgists are always at your service for advice and assistance in the selection of the best tool steel for the job to be done. They will help you get more "mileage" per tool . . . And if you do not have a copy of the illustrated 73-page catalog "Disston Tool Steels," write for your copy today to Henry Disston & Sons, Inc., 326 Tacony, Philadelphia, Pa., U. S. A.

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CROLOY thoroughly *proved* ..in actual practice

Croloy, produced under U. S. Patent 1,695,916, is a chromium-vanadium-molybdenum alloy steel which has won its laurels in many long, difficult production runs right in the Disston plant and in many other important industries . . . in such applications as punches, dies, swaging mandrels, gauges, shear blades, wearing parts, slitting cutters and planer knives. The vanadium content of Croloy is an important factor in producing its high resistance to both impinging and sliding wear and its ready air hardening property.

HENRY DISSTON & SONS, INC.
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DISSTON TOOL STEELS

Eliminates Refrigeration of

AIRCRAFT RIVETS, PARTS

. . . . by use of new aluminum alloy composition and special heat treating procedure. Unusual design of furnace employed in heat treating aircraft armor plate

By **WILLIAM GRASSAM**
Heat Treating Department
Bell Aircraft Corp.
Buffalo

ELIMINATION of the need for keeping aluminum aircraft rivets in a refrigerator to avoid age hardening at room temperatures is an important development since it does away with special handling of these rivets on the assembly floor. The former practice involved keeping the heat treated rivets in refrigerator units on the assembly floor until just a few moments before the riveting operation.

These rivets are made from a special alloy aluminum wire from a material known as A-17-S stock. The rivet making machines developed by Bell were described in STEEL, Jan. 26, 1942, p. 56. Once heat treated, it is unnecessary, according to Bell procedure, to keep these rivets in ice boxes or otherwise to treat them before they are driven. After heat treating, they have a 25,000-pound-per-square-inch rating against shear. Although this rating is slightly below that of the refrigerated type of rivet, causing rivets to be used in larger numbers, the freedom from special care more than makes up for additional number used.

Heat-treating cycle given the A-17-S rivets includes heating for 25 minutes at 935 degrees Fahr. in the Lindberg air furnace shown on page 79 in Fig. 4.

Approximately 10 to 15 minutes is required to get up to heat, the furnace temperature dropping to around 835 degrees Fahr. each time it is necessary to reload the unit. Working chamber is 5 feet deep and 28 inches in diameter.

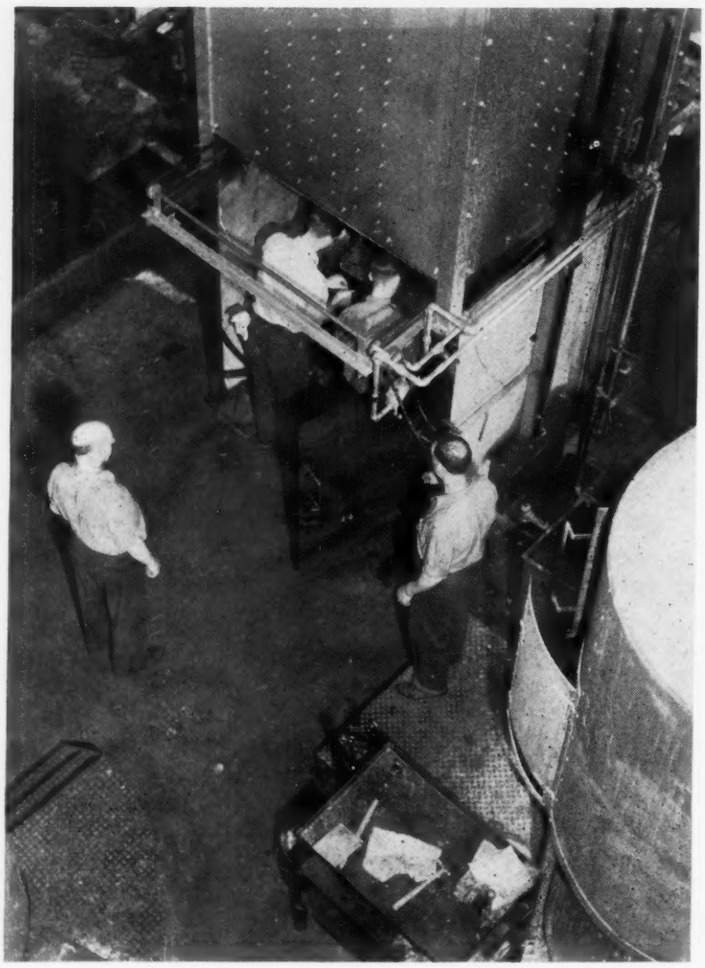

Fig. 1—Loading parts into the rack of the drop furnace. Heating chamber is above loading chamber; quench tank immediately below

A load of rivets consists of eight pans containing a total charge of 160 pounds. The operator in Fig. 4 is shown removing a basket of rivets from the furnace. It will be noted that three of these furnaces are mounted in a row here. Two of these circular Cyclone furnaces are rated 52 kilowatts each; a third, 75 kilowatts. These units have a fan which circulates the heated air through the charge to provide quick and uniform heating.

After being heated, the rivets are quenched in cold water. The result is a hardness ranging from 62 to 92 brinell. The use of the A-17-S alloy and the heat treatment described makes it unnecessary to keep the rivets refrigerated before driving and so greatly facilitates riveting operation in the assembly floor by eliminating the nuisance of keeping rivets cool until driven. This elimination of age hardening at room temperatures is an important development.

Other units in the heat treating department include a 12-kilowatt Lindberg furnace with a working chamber 12 inches wide, 16 inches deep and 18 inches high. This unit is used for small tools at temperatures up to 1250 degrees Fahr. It can be seen at the right in Fig. 4. A portion of the Houghton cyanide furnace is shown at the right in Fig. 1.

One of the important developments in the present conflict is the use of armor plate to protect the pilots and certain portions of the aircraft. Much of this armor is chromium-molybdenum SAE X-4130 steel. After being stamped and formed, this material is heated to 1625 degrees Fahr. in the drop fur-

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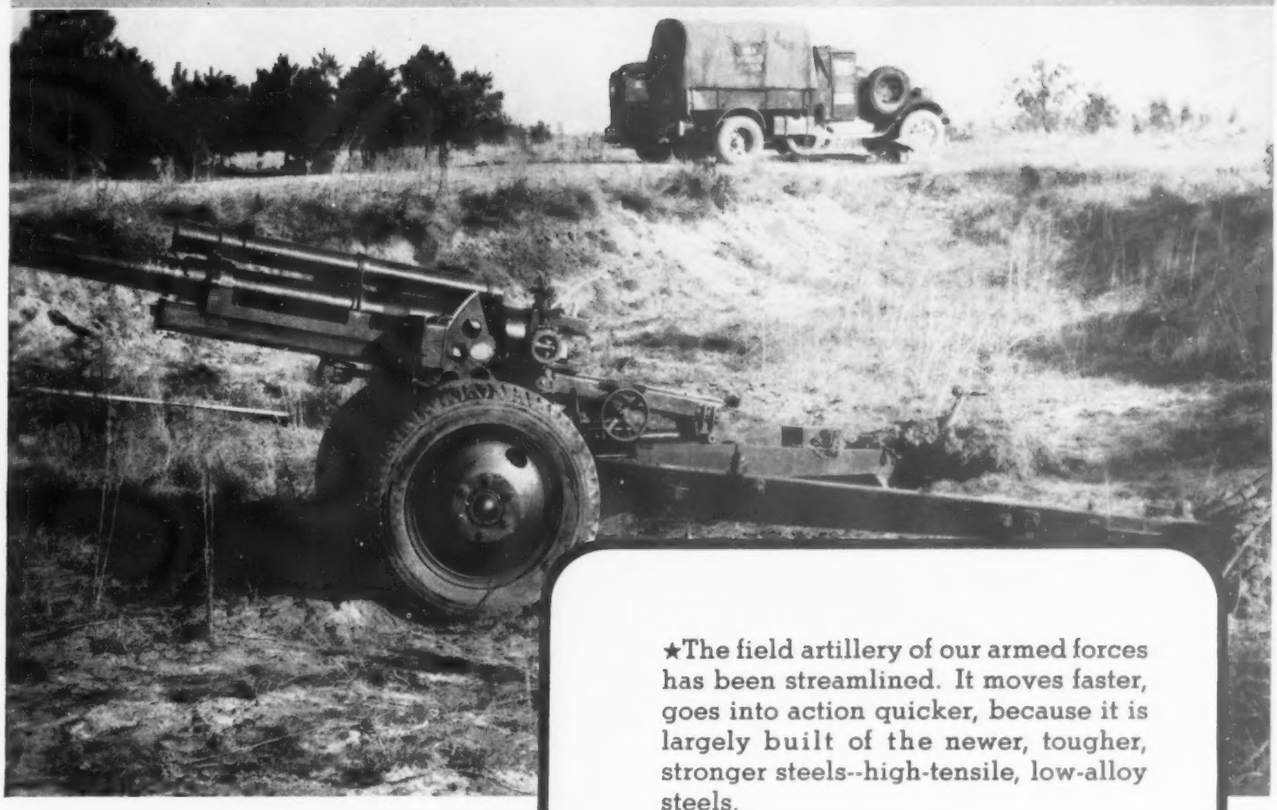

★The field artillery of our armed forces has been streamlined. It moves faster, goes into action quicker, because it is largely built of the newer, tougher, stronger steels--high-tensile, low-alloy steels.

For more than six years Youngstown has been steadily improving Yoloy for military use. Active research has further developed certain characteristics that are all-important to defense equipment--high impact strength especially at sub-zero temperatures, high corrosion resistance, great toughness and strength that make possible lighter weight construction.

So now, with new steels to eliminate dead weight and clumsy bulk at no sacrifice of strength or durability, much of America's mobile defense equipment is being speeded up because of Yoloy.

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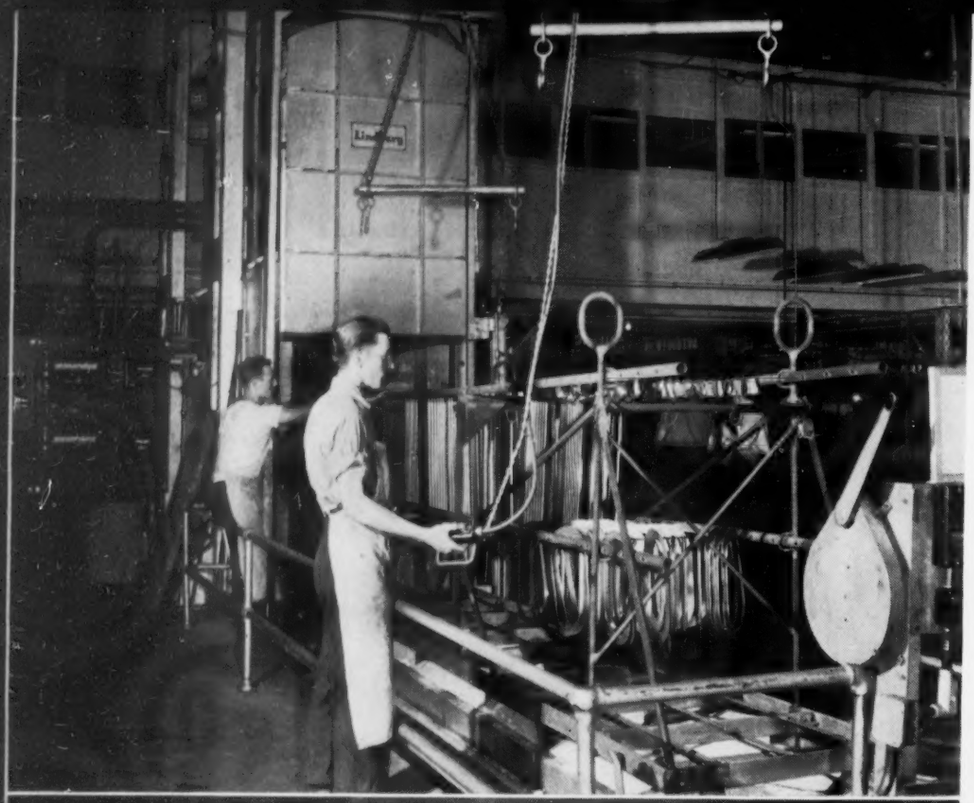


Fig. 2. (Upper view)—Large Cyclone furnace handles many duraluminum parts as well as armor of SAE X-4130. Quench tank is just beyond rack shown. Rack rides in and out of furnace on rails, is lifted and submerged in quench tank by slings and overhead hoist

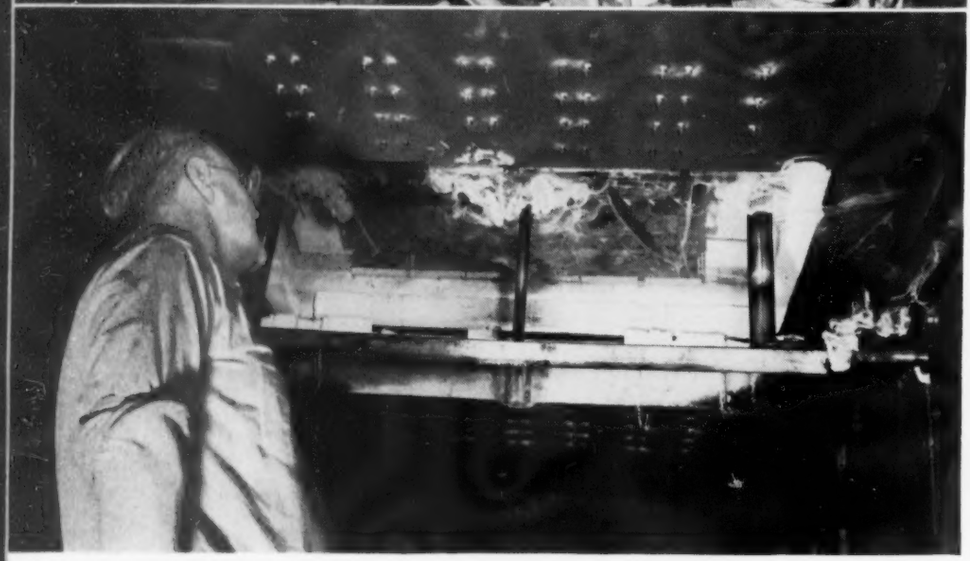


Fig. 3. (Lower view)—William Grassam, heat treating foreman, looks up into heating chamber of the drop furnace, shown here with bottom sections partly opened. Doors cover loading chamber so little heat is lost while heating chamber bottom is opened

nace shown in Figs. 1 and 3. When heated for the required length of time, the parts are dropped into an oil quench immediately below the heating chamber of this unit, producing a tensile strength of 180,000 pounds per square inch.

From this point, the armor is tempered at 850 degrees Fahr. for 1¼ hours in the Lindberg box furnace shown in Fig. 2. This unit has a working chamber 42 inches wide, 16 feet long and 66 inches high. It handles a large number of parts carried on racks as shown in Fig. 2. Racks are slid in and out of the furnace on rails, the work being lowered into and lifted from the quench tank by means of overhead hoist and slings. The quench tank is located immediately below the racks shown in Fig. 2.

This furnace is of the familiar construction in which the heating elements are mounted in a separate chamber, the heat being circulated through the working chamber by means of fans and ducts leading from the heating element chamber. Three zones of heating and control are provided, each zone heated by a separate 45-kilowatt electric heater and furnished with an individual 3-horsepower circulating fan. Furnace is constructed to operate at temperatures up to 1200 degrees Fahr.

As the furnace is loaded, the temperature drops to 800 degrees, but it only requires 20 minutes for it to again reach the 850-degree working temperature.

A furnace of somewhat unusual design is the drop unit made by the Falls Electric Furnace Corp., Buffalo, and shown in Figs. 1 and 3. It is used for hardening the armor plate previously mentioned and other aircraft parts including various brackets and wing fittings forged from SAE X-4130 chromium-molybdenum steel.

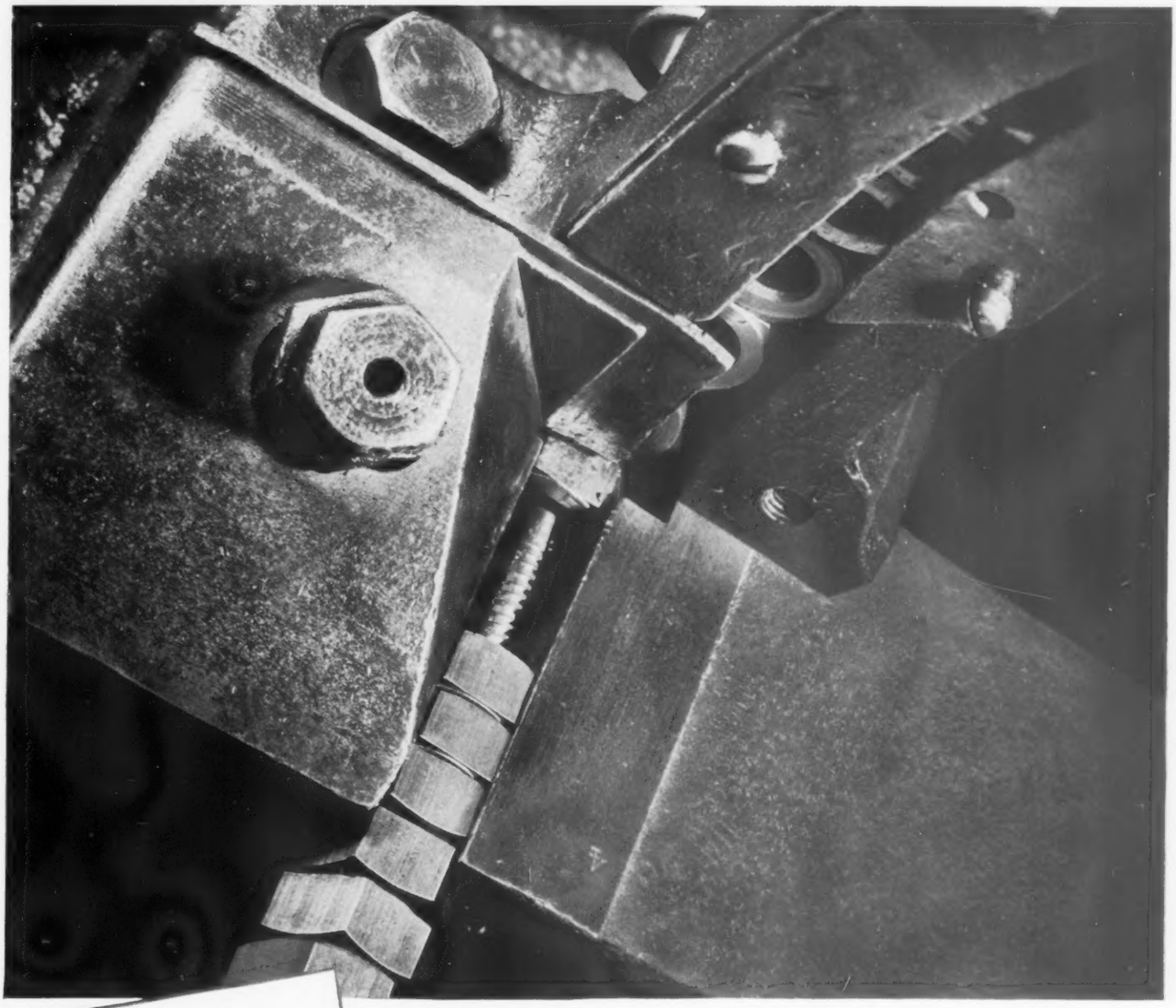
This unit consists of three sections—a heating chamber, the bottom of which is some 7 feet above floor level; immediately below this, the loading and unloading chamber; and below floor level and in line vertically with the other two chambers, an oil quench tank. The idea is to permit loading and unloading the work at floor level, hoisting it into the heating chamber, then dropping it immediately into the oil quench bath from the working chamber.

Thus quenching can be done almost instantly from soaking temperature with extremely little exposure to the atmosphere. At the same time, this setup provides for efficient handling of the work during heating and quenching since the parts do not have to be rehandled at any point in the cycle.

Fig. 1 shows operators loading work into the rack which accommodates four trays, each 15 inches square and 5 inches deep, the trays and rack being made of nickel alloy steel to withstand the repeated heating.

Heating chamber of this unit is 5 feet square, 7 feet high and is heated by electric resistance elements located on the sides and bottom of the chamber. No circulation of furnace atmosphere is necessary. To introduce work into the heating chamber, the two halves of the split bottom of the chamber are slid apart to front and rear of the furnace as shown in Fig. 3 which is a view looking up into the working chamber with the furnace bottom partially opened. The two sections that form the bottom of the working chamber are opened and closed by means of a chain drive connected to a crank mechanism which is hand operated.

The work to be heated is supported on a rack which extends up through the bottom of the heating chamber between the two bottom sections. This rack is carried on guides and is lifted and lowered by means of an air cylinder operating through a cable hookup. Moving a 3-way air valve lowers the rack



The illustration shows one operation on a tapping machine in R B & W's famous Coraopolis plant — the world's only one-purpose plant built for making cold-punched nuts alone. To be fit for expanded war needs, all tappers in this great plant have been redesigned and rebuilt or replaced. At Coraopolis, cold-punched nuts are manufactured in sizes from 3/8" to 1 1/2"; smaller and larger nuts are produced at Port Chester.

Stronger Threads for the Lifelines of Armies

THEY'RE PLODDING now across a dozen embattled countries . . . through mud, over hot sand, into the teeth of bitter cold . . . American-made trucks on bruising, axle-busting, bolt-straining journeys to bring Allied fighters food and ammunition.

It's the kind of job that calls for American organization . . . American nerve . . . American stamina.

You'll find R B & W bolts and nuts on those trucks, stout, indomitable . . . just as you'll find them wherever the service is tough . . . in army tanks, in plows and tractors, in the locomotives and bridges and ships that make America strong.

Many thousands of tons of R B & W's Empire-brand bolts and nuts went on the job last year—more again this year. Because the men who know the beating those assemblies will get . . . know that R B & W bolts and nuts can "take it."

Russell, Burdsall & Ward Bolt and Nut Co. Factories at Port Chester, N.Y., Rock Falls, Ill., Coraopolis, Pa.; sales offices at Philadelphia, Chicago, Detroit, Chattanooga, Los Angeles, San Francisco, Portland, Seattle.

RB&W

Making strong the things that make America strong

BOLTS EMPIRE NUTS RIVETS

AND ALLIED FASTENING PRODUCTS . . . SINCE 1845

THE CLEVELAND-CLIFFS IRON CO.

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Fig. 4—Three Lindberg Cyclone circular forced-air-circulation furnaces for heat treating rivets and other small parts. Small tool hardening furnace is at right

and work from the heating chamber directly into the quench tank below. After being quenched, the work is raised to floor level, where the trays are removed and reloaded.

The furnace is rated 70 kilowatts, the heating chamber being held at 1625 degrees Fahr. by a system of automatic controls and a thermocouple located about two-thirds of the way to the top of the heating chamber.

Most of the items handled in this unit are chromium-molybdenum forgings, longest dimension of which is 2 inches or less, with the heaviest section being limited to 1 inch or less. After being charged into the furnace, about one hour is required for the furnace to come to full heat. After this, work is allowed to soak for about a half hour for material of maximum thickness.

As the work is discharged from the furnace, temperature of working chamber drops to around 1300 degrees Fahr. About one hour then is required to regain the full temperature of 1625 degrees Fahr. When starting up the furnace cold, another hour is allowed for the chamber to come to working temperature.

After being heat treated, the work tests around 150,000 pounds per square inch in tensile tests and has a hardness ranging from 32 to 37 rockwell C. Output from this unit easily reaches 2000 pounds of small parts per 8-hour shift. Occupying but a small amount of floor area and minimizing handling operations, this furnace setup forms one of the most important units in the heat-treating department.

Steel Treatment Cards Augment Disston Series

Conservation control plan sponsored by Henry Disston & Sons Inc., Philadelphia, and explained to some length on page 60 of the Jan. 26, 1942 issue of STEEL, now has been augmented by additional important material.

To the original series of conservation control cards giving instructions on "long-life" operation of a wide variety of metal and woodworking tools, there have been added Nos. 40 to 45 dealing with heat treatment and use of modern tool steels. Steels covered by these cards are: (40) tungsten-molybdenum high speed steel; (41) water-hardening carbon or carbon-vanadium tool steel; (42) air-hardening high-carbon high-chromium steel; (43) oil-hardening tool steel; (44) chrome-tungsten chisel steel; and (45) nickel-chrome oil-hardening tool steel.

In each case, one side of the 4 x 6-inch card is devoted to cause and correction of common failures in tools made from the steel in question, while the reverse side carries specific working instructions, including forging, annealing, hardening, drawing, and grinding.

Another item now available is a 4½ x 6½-inch booklet called "The Pocket Foreman." This explains how best to apply the conservation control plan in a plant. It details material available and carries full-size reproductions of all cards in the original series. This enables a foreman to select those which particuluarly fit the needs of his department.

The company stands ready to furnish to industries and vocational schools—without cost—any of the material included in the plan. Applications should be made direct to Disston by an accredited representative of the organization desiring the material, by letter on that organization's letterhead.

Constructs Hose Entirely Of Synthetic Material

B. F. Goodrich Co., Akron, O., reports it has substituted its own synthetic rubber, Ameripol, in the construction of its type 400SS oil hose. By incorporating this synthetic product in every part of the hose, the latter is resistant to the action of oils, gasoline or other solvents of natural rubber, according to the company. The new construction also is stated to afford stronger adhesion of all parts with an additional margin of safety against ply separation.

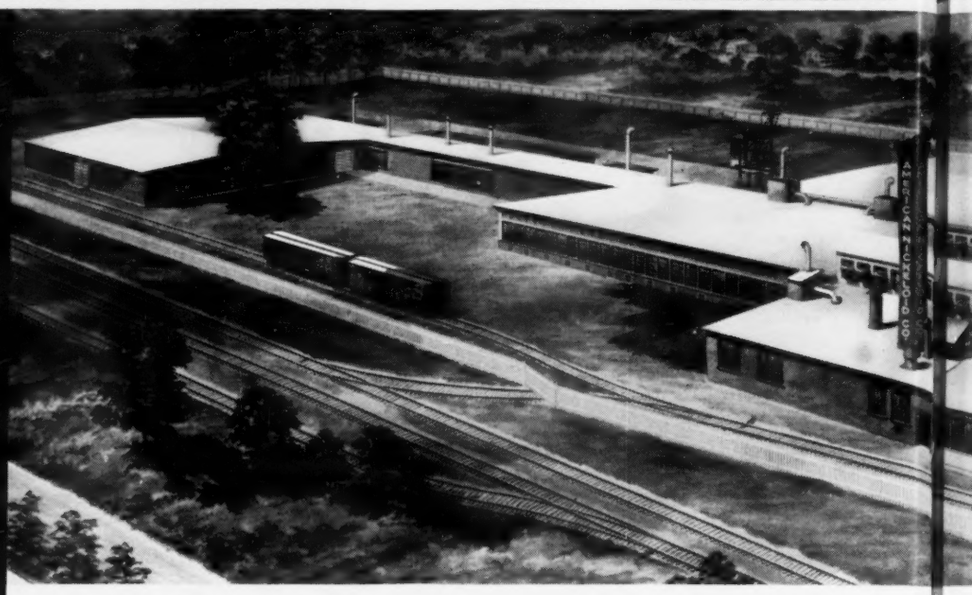
New Material "Kills" Moonlight Reflection

Reflection from mirror-like surfaces such as glass areas, shining automobile tops, etc., can be neutralized or deadened immediately by the application of a new visual deception material developed by Truscon Laboratories, Detroit. Known as VD Glaze, it may be applied over concrete, brick, terra cotta, paint, besides glass and steel.

Material may be used in conjunction with blackout curtains, screens or panels; providing daylight to building interiors when desired; eliminating outside glare from windows under moonlight or flares; presenting an opaque aspect when viewed from the outside which blends in with the camouflage scheme of the surrounding area. It is made in a clear white translucent, called "white sand" and tints, the latter being made to simulate standard Army camouflage colors.

LET'S PUT OUR

IF CRITICAL METAL SUBSTITUTION IS YOUR HEADACHE, then American Electroplated Metal is the answer to your problem — and YOU are the answer to OUR problem. We're trying to convert the industry's largest pre-finished metal coil mill to war-time production. Let's work together!



Plated Steel in Sheets and in Coils . . AND 10 OTHER VICTORY METALS

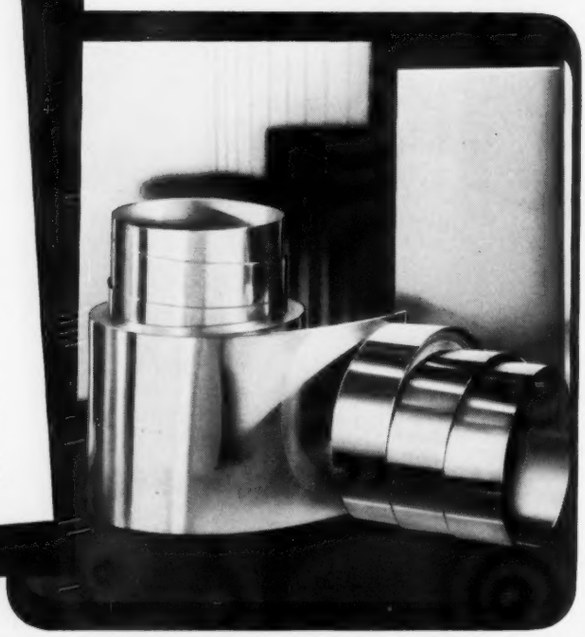
IS YOUR PROBLEM SIMILAR TO ONE OF THESE?

We Can Help!

American Electro-plated metals have been specified — or are under consideration by the Government — for the following Defense applications:

Barrack Mirrors, Ship Running Lights, Squeegee Plates, Army Kitchen Equipment, Dispatch Case Channels, Airplane Mirrors, Fryers, Coffee Makers, Testing Equipment, Trunk Hardware, Mess Equipment, Sterilizing Cabinets, Hospital Furniture, Boxes, and Containers.

In each case the saving of critical metal is substantial. If you have a Government order using critical metal call us in. Our metallurgists will cooperate fully to determine which American Electro-plated Metal will be most satisfactory.



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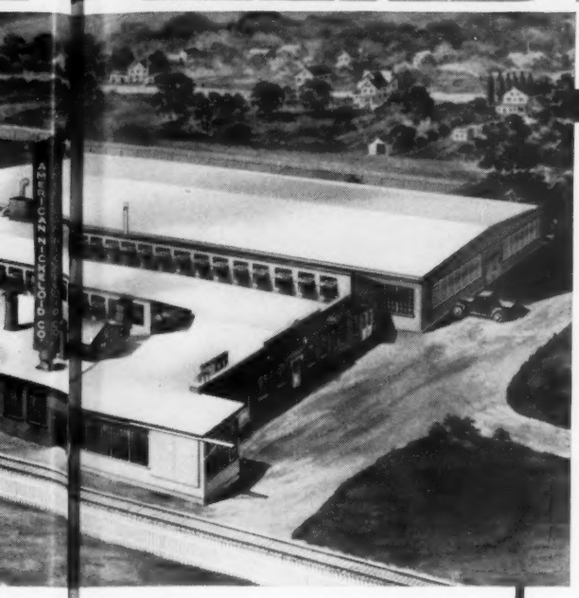


WE HAVE a serious problem. And you perhaps can solve OUR problem by letting US help solve YOURS. OUR problem, strangely enough, is the modern, well-equipped electro-plating coil mill shown here — the largest of its kind in the industry. The electro-plated metals produced here — when used in defense items — conserve marked quantities of critical metals.

BUT (and here's our real problem) many Defense manufacturers who could meet government specifications with an American Electro-plated Metal — electro-plated steel, for instance — are using a prime, critical metal. Are you one of them? If you are producing a government order using critical metal won't you investigate the suggested American Electro-plated Metal? You'll help your government, your own company, and ours.

Without your priority orders, we cannot get material and this huge plant cannot serve the government as we want it to do. If we can HELP YOU, you can HELP US greatly.

American ELECTRO-PLATED Metals

Conserve CRITICAL COPPER, BRASS, ALUMINUM NICKEL, TIN, STAINLESS STEEL, and CHROMIUM

Look! These are Actual Conservation Figures

Comparative Quantities of Strategic Metals Used in Manufacture of 1000 Sq. Ft. of .025" Commercial Metals

Critical Metals Used in Manufacture	solid Copper	ANCO Copper Plated Steel*	18.8 Stainless Steel	Nickel Copper Alloy	ANCO Chromium Plated Steel*
Nickel	—	—	87.8 lbs.	766.7 lbs.	15.5 lbs.
Chromium	—	—	197.6 lbs.	—	.37 lbs.
Copper	1159 lbs.	13.8 lbs.	—	383.3 lbs.	13.8 lbs
Total Weight Critical Material	1159 lbs.	13.8 lbs.	285.4 lbs.	1150 lbs.	29.67 lbs.

*Weight of Steel used in Anco plated steel, 1,045 lbs. per 1,000 sq. ft.

Write FOR YOUR COPY OF THIS . . . "DEFENSE SAMPLER"

Write on your Company letterhead for this informative Sampler, which gives pertinent information about these plated metals and shows actual metal samples. Sent without charge to key individuals in defense plants or Governmental agencies.

COLD WEATHER ORE HANDLING

. . . . safeguarded by electric strip heaters which put heat where wanted

By **MAXWELL GREENLER**
Cleveland Electric Illuminating Co.
Chardon, O.

THE GIANT iron ore unloading machines, the traveling bridge for the ore storage pile and the coal dumping machines of the Ohio & Western Pennsylvania Dock Co., Ashtabula, O., employ a number of electric strip heater applications which have been found valuable in speeding and safeguarding the handling of ore at this important dock.

Because of the volume of material, speed with safety is essential as some 10,000 tons of iron ore are unloaded in four hours or less. The cargo holds are then refilled with coal at the rate of 30 to 40 cars of 50 tons each every hour.

Operators of the various unloading machines often work in rather cramped quarters. This involves a certain amount of difficulty in heating these key locations satisfactorily. But now 2 kilowatts of electric heat is supplied from four 500-watt electric strip heaters in the operator's cab of each of the six ore-unloading machines. Also the operator's rest shanty on each machine is heated by four more 500-watt strip heaters. On the bucket platform of the scale shanty of two machines four more 500-watt units are provided for the shovelers who help keep the platform clean.

In addition to the operators, certain vital parts of the machinery which must function dependably even in below-zero weather are safeguarded. The dashpots of the motor starters are kept warm by 250-watt heaters when needed. Strip heaters were supplied by General Electric Co., Schenectady, N. Y.

A direct-connected motor-driven air compressor is used in the winter months for repair work. To avoid difficulty from congealed oil in zero weather, the oil in the crankcase is kept fluid by two 500-watt electric strip heaters mounted underneath the crankcase and supplied with current each night during the winter season.

The coal shipping season usually opens earlier and lasts longer than the ore shipping season because coal shipments can be made to ports not in the upper lakes. For this reason, operators of the coal dumping machines encounter more severe cold weather, so the office of the car dumper is heated with five 500-watt electric units. The telescopic chute of the dumper is controlled by an operator immediately above the chute. His quarters are cramped and his work extremely important so his cab is heated by six 500-watt electric units—ample to keep the operator comfortable even on the coldest day.

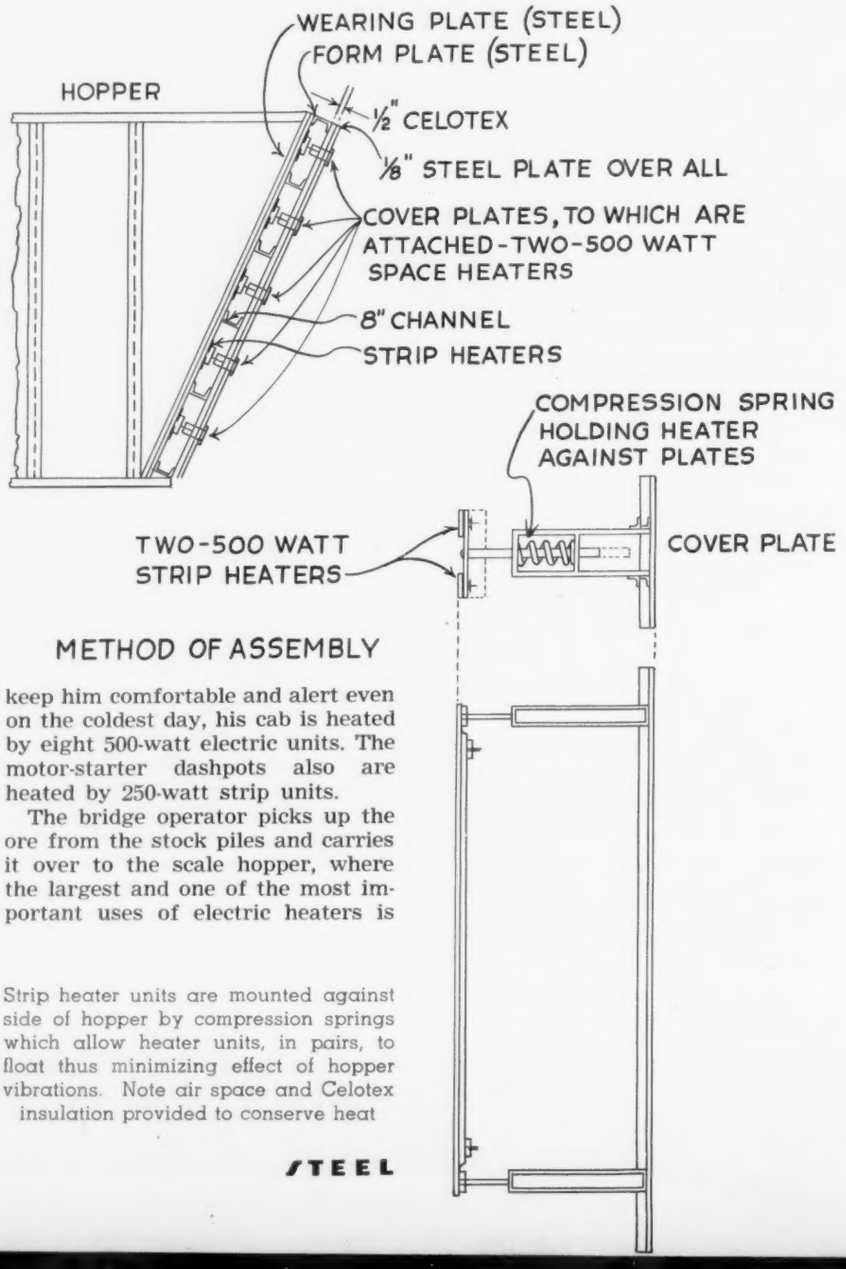
However, even when the huge ore and coal freighters are locked in the harbor by ice fields, ore movement still goes on for it is then that the ore bridge moves the iron ore from stock piles to the scale hopper, where the ore is weighed and dumped into waiting cars below to be moved to the steel mills.

The crane cab operator on the ore bridge is placed where there is no escape from wintry blasts. To keep him comfortable and alert even on the coldest day, his cab is heated by eight 500-watt electric units. The motor-starter dashpots also are heated by 250-watt strip units.

The bridge operator picks up the ore from the stock piles and carries it over to the scale hopper, where the largest and one of the most important uses of electric heaters is found. The scale hopper is made of steel plates, two of the four lower sides of which are at 50-degree angles. Frost in the steel plates may combine with the moisture in the iron ore to slow down or completely stop the movement of ore through the hopper.

To keep the ore from sticking, hot-air furnaces were originally used. But the hot air, always rising, did not heat the lower part of the hopper where most of the trouble occurred. Other companies have used steam pipes to heat the hopper, but the vibration of the equipment is so severe that difficulty is encountered in maintaining the pipelines intact. In addition,

(*Please turn to Page* 109)



Strip heater units are mounted against side of hopper by compression springs which allow heater units, in pairs, to float thus minimizing effect of hopper vibrations. Note air space and Celotex insulation provided to conserve heat

Lewis ROLLS

BETTER FINISH INCREASED TONNAGE

Lewis Tube Mill Rolls give an exceptionally smooth finish to the work and hold their size far beyond the usual expectancy. All Lewis Rolls are manufactured under procedures which are the outcome of years of experience. They give ultimate satisfaction in the mills.

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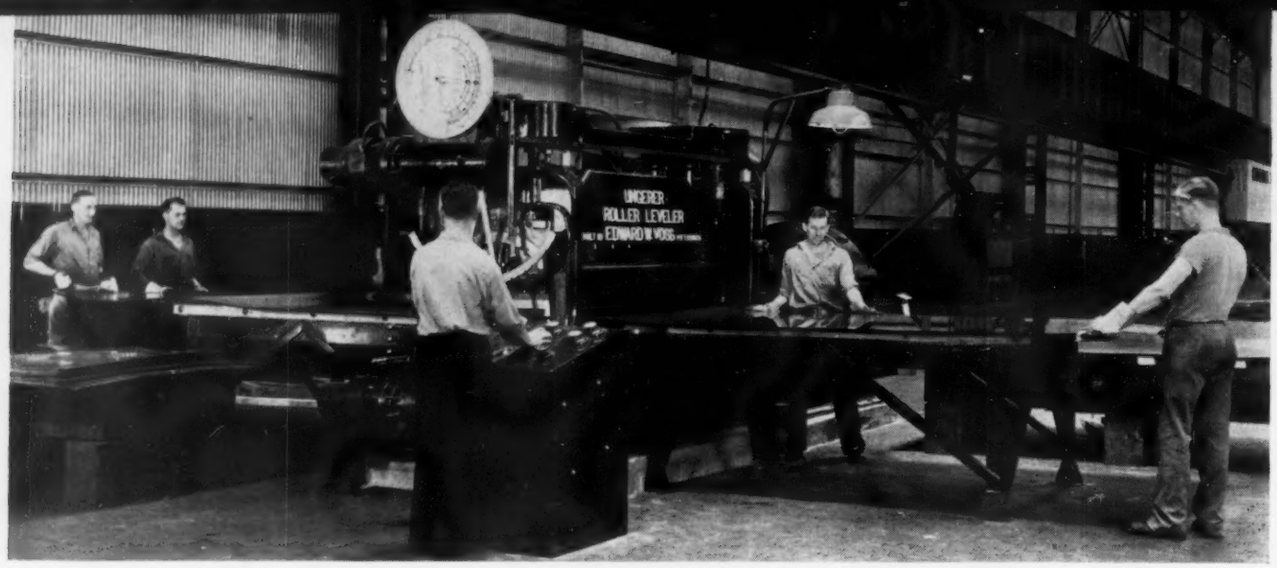


Fig. 1—Leveler designed with electrical control. All controls are centralized at the operator's pulpit

Flattening Sheets and Strip by ROLLER LEVELING

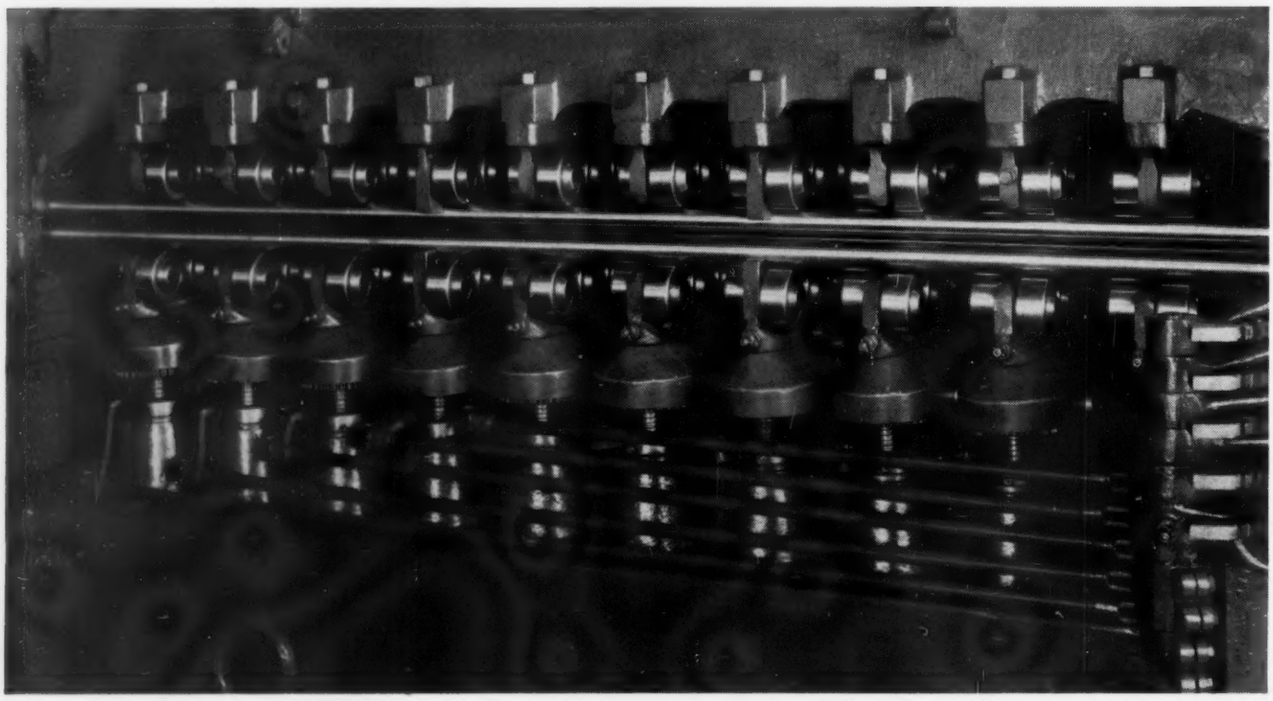
By **FRANK W. ROBERTSON**
General Manager
Edward W. Voss
Dormont, Pittsburgh

SHEET AND STRIP leaving the last stand of finishing rolls usually are not flat enough for commercial use. If rapid, low-cost methods of manufacture were not essential, any of the rolling operations could be controlled to produce what is generally termed a commercially flat sheet. However, the expense involved in controlling the primary rolling of the strip to make it flat would be prohibitive. In practice, therefore, specialized leveling equipment is necessary, and the degree of flatness required in the finished product naturally depends on the use to be made of it. As specifications for flatness have become increasingly rigid, in recent years, the equipment used to secure this flatness has received greater attention.

Because the demand today is for sheets approaching absolute flatness, levelers which were previously considered satisfactory do not meet current specifications. In lieu of adequate leveling facilities, producers have sometimes resorted to rerolling the stock in a cold mill or a temper mill. This method entails unreasonable operating expense and, in some cases changes the characteristics of the metal.

Stretcher leveling is another costly means of flattening sheets, both in terms of time and labor and of scrap loss from gripper ends. Sketch *A* in Fig. 6 illustrates this process.

Fig. 2—Ungerer type of leveler showing the small leveling rolls and the multiple backup roller design



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Size 1 Combination Linestarter, Class 11-206

Westinghouse Nofuze Circuit Breaker

1 ACTS AS MANUAL DISCONNECT SWITCH. Locking arrangement permits padlocking cabinet closed and switch in off position. Eliminates need for separate switch. "De-ion" arc quenching protects contacts.

2 PROTECTS CIRCUIT AGAINST OVERLOADS. Bi-Metal gives positive protection against short circuits and severe overloads . . . does away with need for fuse equipment. Unvarying — factory-calibrated — self-indicating.

Westinghouse "De-ion" Linestarter

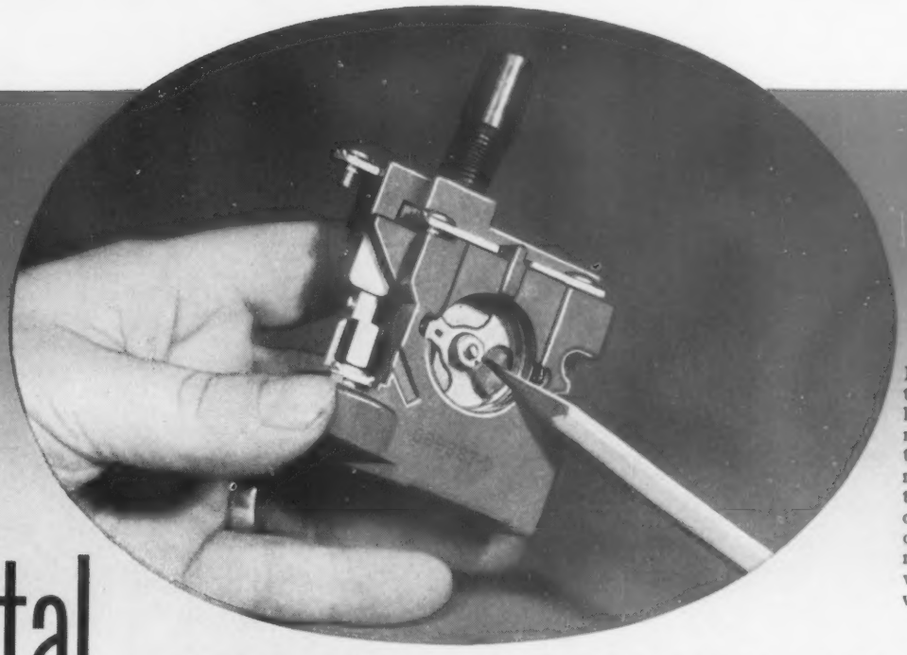
3 GIVES MAGNETIC ACROSS-THE-LINE STARTING. Permits operating motors by push button, float or pressure switch. Contacts opened and closed by direct-acting, vertical solenoid magnet. "De-ion" arc quenchers protect contacts.

4 PROTECTS MOTOR AGAINST OVERLOADS. Bi-Metal relay calibrated to protect motor permits momentary overloads as in starting, but protects motors from sustained overloads.

Save wiring—save time—save space! This single "package" contains everything you need for the motor circuit in one compact, easily installed enclosure.

Westinghouse Combination Linestarters combine the advantages of Nofuze Circuit Breakers and "De-ion" Linestarters. They eliminate delays for fuse replacements, and simplify the job of providing proper control and protection for motor circuits. Specify them . . . install ONE unit—and do FOUR jobs! Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

Westinghouse



Disc type Bi-metal protection as used in Westinghouse Motor Starters. Bi-metal disc is composed of two metals with different rates of expansion, bonded together. When heated by overload, the disc snaps, opening the circuit. Bi-metal protection is unvarying—has nothing to wear out or replace.

Bi-metal PROTECTION . . . A WESTINGHOUSE FEATURE

THAT MEANS ADDED PROTECTION FOR VITAL CIRCUITS

Motor or circuit protection that operates when it doesn't need to, means unnecessary production delays to replace fuses or restore service. Protection that is prevented from operating when it should, means even more expense in damaged motors or machines.

BI-METAL protection—a Westinghouse development—solves both problems. It acts with uncanny accuracy to permit temporary overloads, as when motors are started across the line, yet snaps the circuit open with rifle-bullet speed when short circuits or dangerous overloads occur. Factory-calibrated, it can't be tampered with or held closed against short circuits.

BI-METAL is a basic protective feature of Westinghouse motor starters and circuit breakers—you get it at no extra cost. Use it for the added, accurate protection it affords—specify Westinghouse protective and control equipment.

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa.

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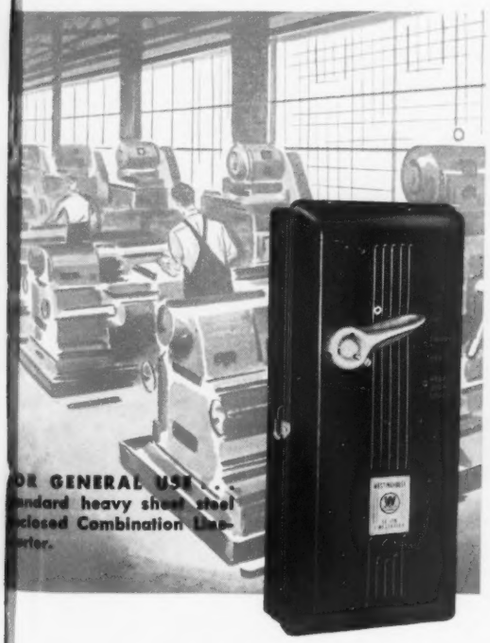
"DE-ION" COMBINATION LINESTARTERS MEET JOB REQUIREMENTS



OR GENERAL USE . . .
andard heavy sheet steel
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FOR DUSTY LOCATIONS . . . sheet steel gasketed dust-tight and splash-proof enclosure.

FOR WET LOCATIONS . . . Cast iron gasketed watertight and weatherproof enclosure.

Motors and Control

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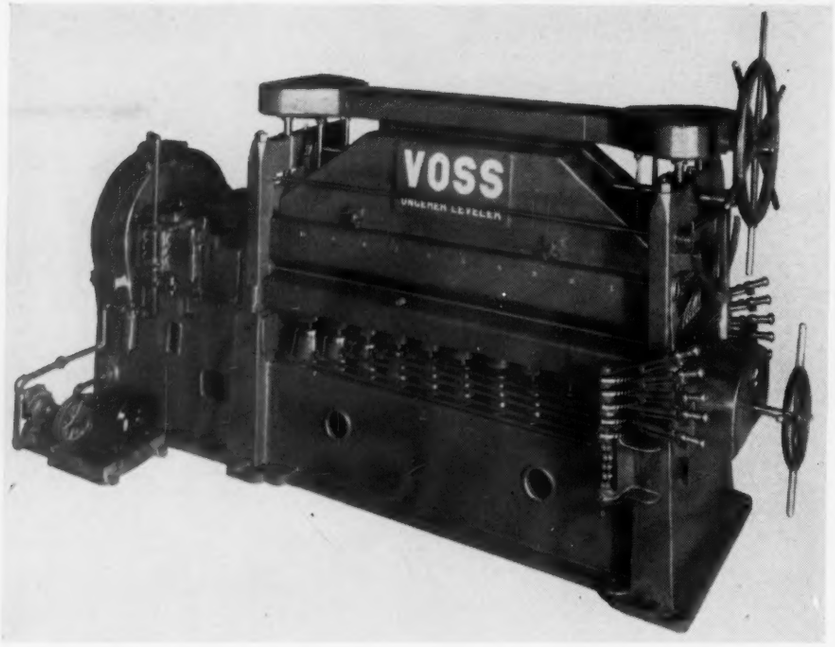


Fig. 3. (Immediately above)—Manually-operated leveler showing hand levelers for adjusting the bottom backup roller groups

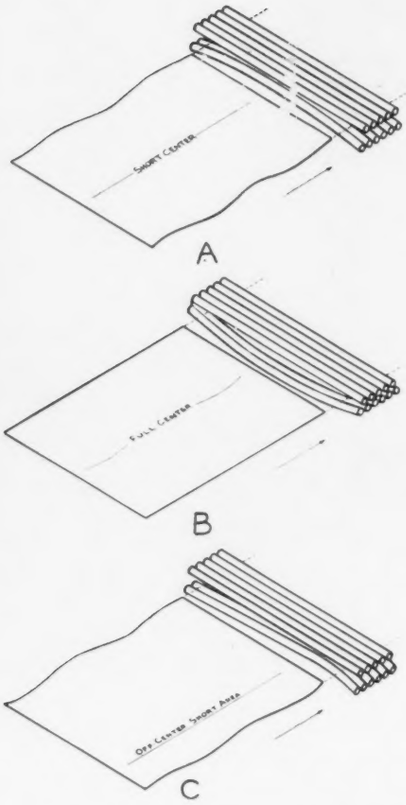


Fig. 4. (Right)—Sketch showing how top and bottom leveling rolls are adjusted to meet various surface conditions

Though once considered the only method of obtaining a high degree of flatness, the stretcher leveler has many limitations. Difficulty is encountered particularly with light-gage or high-tensile material or sheets of varying thickness or physical characteristics across their width.

Most flattening is done on roller levelers, however, and it is to this type of equipment that producers now look for effective, low-cost leveling of sheet and strip. Consisting, essentially, of two tiers of closely set rolls, one over the other, a roller leveler bends the material up and down, alternately, over the interrupting arcs of the rolls. This basic design is shown at *B* in Fig. 6. Cold working in such a manner tends to relieve strains in the material and to flatten it somewhat. The effectiveness of this process depends, to a large extent, on the number of rolls employed and on their diameter in relation to the thickness of the sheet being conditioned.

Many of the older type levelers do not go much beyond the basic leveler design and have been built with ruggedness, rather than performance, as the prime consideration. The effect of such levelers is to improve the material more or less. This is true of the simple 2-high levelers as well as of those whose rolls are supported by a single backup roll at the center. Fig. 7 shows a leveler of this type.

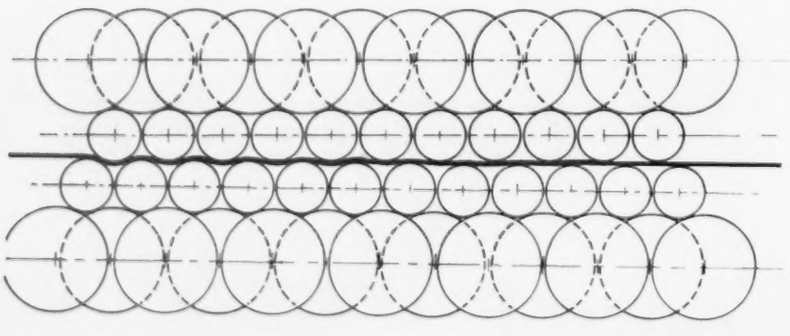
Often where the rolls receive insufficient backup support, they will deflect in such a way as to produce wavy edges in the material. Sometimes the material is rolled with a full center to counteract this tendency, but such a procedure is uncertain and, usually, unsatisfactory. A great disadvantage of the old-type levelers is the large roll diameter required to maintain rigidity under leveling pressure. The result is that these levelers do not bend the material over a sufficient small radius to affect it appreciably.

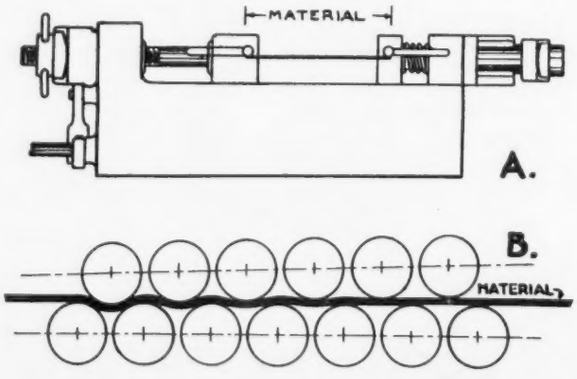
Roll diameters have been reduced, in some cases, by the use of three sets of backup rolls to support the leveling rolls. This design permits smaller work rolls than those of the 2-high leveler and is, consequently, more effective; but it is not altogether successful in straightening badly buckled sheets nor does it produce a high degree of flatness.

As engineering and production in-

Fig. 5. (Left, below)—Sketch showing the arrangement of backup rollers to give support to the leveling rolls front and back

Fig. 6. (Right, below)—Sketch of a conventional type stretcher leveling machine is designated **A.** That designated **B.** illustrates the bending action imparted by a roller leveler





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The "Jeep" and the Oster No. 601 machine have a lot in common. Both are versatile, easy to handle, quick-acting, ruggedly built, low in cost and high on performance. Both meet vital war needs NOW and assure wide use in the post-war future.

Batteries of Oster No. 601's in Action on Shell Contracts!

First and second operation jobs on 20, 37, and 40mm shells are now being handled by Oster No. 601 Turret Lathes. The manually controlled, six-position turret makes it easy to train new men rapidly. *Highly skilled operators not required.*

Cost? Without tools, the Oster No. 601 costs less than $2000.00. *Delivery?* In 12 weeks or less! *But act NOW to assure prompt scheduling of your order!*

QUICK DESCRIPTION OF THE OSTER NO. 601 SIMPLIFIED TURRET LATHE

Motor driven (2 H.P. two-speed motor). Designed with hand feed to cross slide. Equipped with manually operated 6-position turret; or with plain saddle (where three or fewer operations in sequence are to be performed.)

Two optional types of drive: WORM DRIVE (for making heavy forming cuts at relatively slow speeds); DIRECT DRIVE (for small diameter work or for non-ferrous metals at speeds up to 3000 R. P. M.)

Automatic chuck capacity: 1-1/2" round bar; 1-1/16" square bar; 1-5/16" hex bar. Swing over bed: 14". Swing over cross slide: 6-1/2". Carriage travel: 11" when there is a cross slide on 33" main ways. Maximum movement of screw feed cross slide is 6-1/2" and 4-1/2" for lever feed cross slide.

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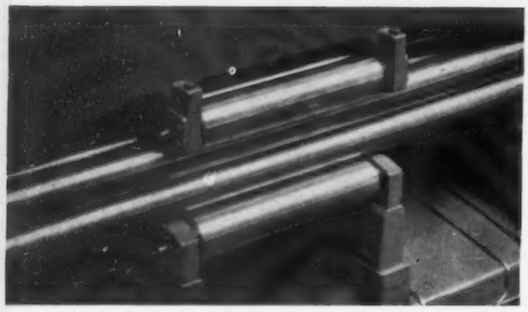


Fig. 7—Leveling rolls of the 2-high type supported in center by a single backup roll

formation has increased, so leveling equipment has been refined. Influencing the practice and standards of roller leveling, in recent years, has been the Voss Ungerer leveler, built by Edward W. Voss, Pittsburgh. Incorporating a system of selective control for localizing roll pressures, the Voss leveler has brought the so-called "patent leveler" into the production class.

Distinguishing the Voss Ungerer leveler from other types of leveling machines are its exceptionally small leveling rolls and its multiple backup roller design. Fig. 2 shows one of these levelers with roll guards removed. As can be seen, both top and bottom sets of leveling rolls are supported by several groups of narrow, large diameter backup rollers. Each group, mounted parallel to the leveling direction, consists of two rows of rollers staggered in such a way that each leveling roll receives support front and back. This construction is shown diagrammatically in Fig. 5. Accidental deflection of the leveling rolls is thus eliminated. Rigidity resulting from this design permits the use of rolls considerably smaller, for a given sheet thickness, than are commonly used—thereby increasing the capacity of the leveler, sometimes as much as 100 per cent over an unbacked-up leveler of a similar size.

In addition to preventing incidental deflection of the work rolls, the backup system of this type leveler serves the purpose of adjusting or "shaping" the rolls to suit the condition of the material. The value of such adjustments is self-evident. The "kneading" action of the straight leveling rolls cold-works the metal somewhat, mostly at the surface; but taken alone, it does not flatten extreme buckled surfaces, especially in cambered or short-centered material. By bending the rolls or otherwise changing the relationship between the top and bottom sets of rolls, short areas may be worked harder and stretched to the normal length of the sheet.

Screwdown Is Provided

Such adjustments are possible on this type of leveler and are effected by screwdown adjustment of the top roll assembly and by flexing the bottom work rolls through vertical adjustment of the individual backup roller groups. In the first method, the upper leveling rolls are not bent, but are tilted or raised or lowered as a unit with respect to the lower set of rolls. Thus, for cambered sheets, the top flight of rolls is tilted to bring greater pressure to the short edge of the material.

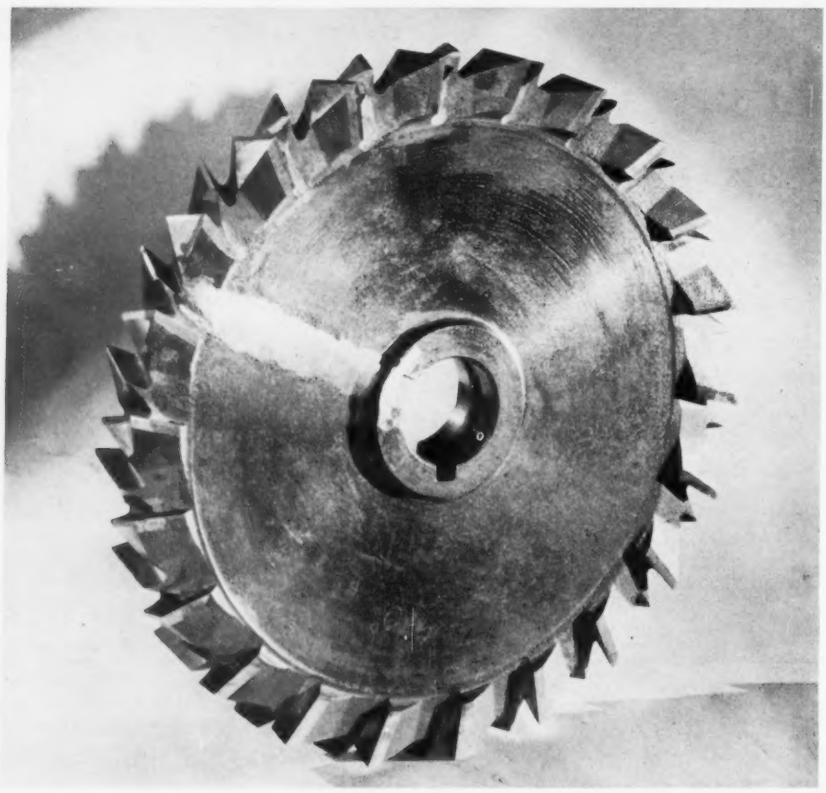
Tilting the upper set of rolls radially, i.e., with the two flights of rolls closer at the entry side than at the delivery side of the machine, diminishes the pressure on the sheet as it passes between the successive rolls of the leveler. This tilt is common to all roller levelers and can be seen in both Figs. 5 and 6-B. Being reversible on the Voss leveler, radial adjustment permits operation of the leveler in either direction.

Bending the bottom work rolls, by means of backup adjustment, makes it possible to regulate the leveling pressure on any part of the material and to change leveling pressures while the leveler is in operation. For flattening short-centered sheets, the middle backup roller groups are raised to place greater pressure on that area. Full-centered sheets receive greater pressure at the edges. Both conditions are shown to an exaggerated degree at *A* and *B* in Fig. 4. In either case, the adjustment is made by a handwheel or motor control, operating a series of wormwheel drives which raise or lower the bottom backup roller groups. Since the middle roller groups travel further than each successive group toward the ends of the rolls, the rolls bend to form an arc when the material passes over them.

Where off-center short areas exist, independent adjustment of any one or more backup groups increases or decreases the pressure at the desired point, as indicated by *C* in Fig. 4. Individual hand levers to each of the bottom backup roller groups

(*Please turn to Page* 109)

How To Save $75 and Management Disposition



TWENTY-FIVE dollars worth of welding put this $100 keyway cutter above back to work. In repairing the 0.005-inch crack which extended from keyway to base of the cutting tool, grooves were extended on both sides of the cutter and ground ⅛-inch. The cutter then was preheated to 800 degrees Fahr., and welded with a Westinghouse Flexarc 18-8 stainless steel rod, ⅛-inch in diameter. The piece was reheated to the previous temperature and allowed to cool slowly in an open furnace. Later it was hardened by heating to 2300 degrees Fahr., followed by cooling in an air blast

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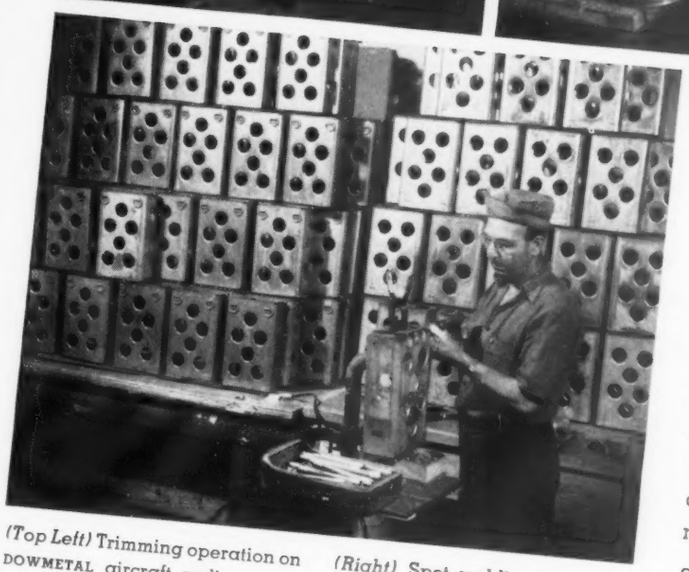

(Top Left) Trimming operation on DOWMETAL aircraft radio masts.

(Center) Finishing operation on DOWMETAL wheel fairings.

(Right) Spot welding operation on DOWMETAL tank baffle.

(Lower Left) Riveting operation on fabricated DOWMETAL part.

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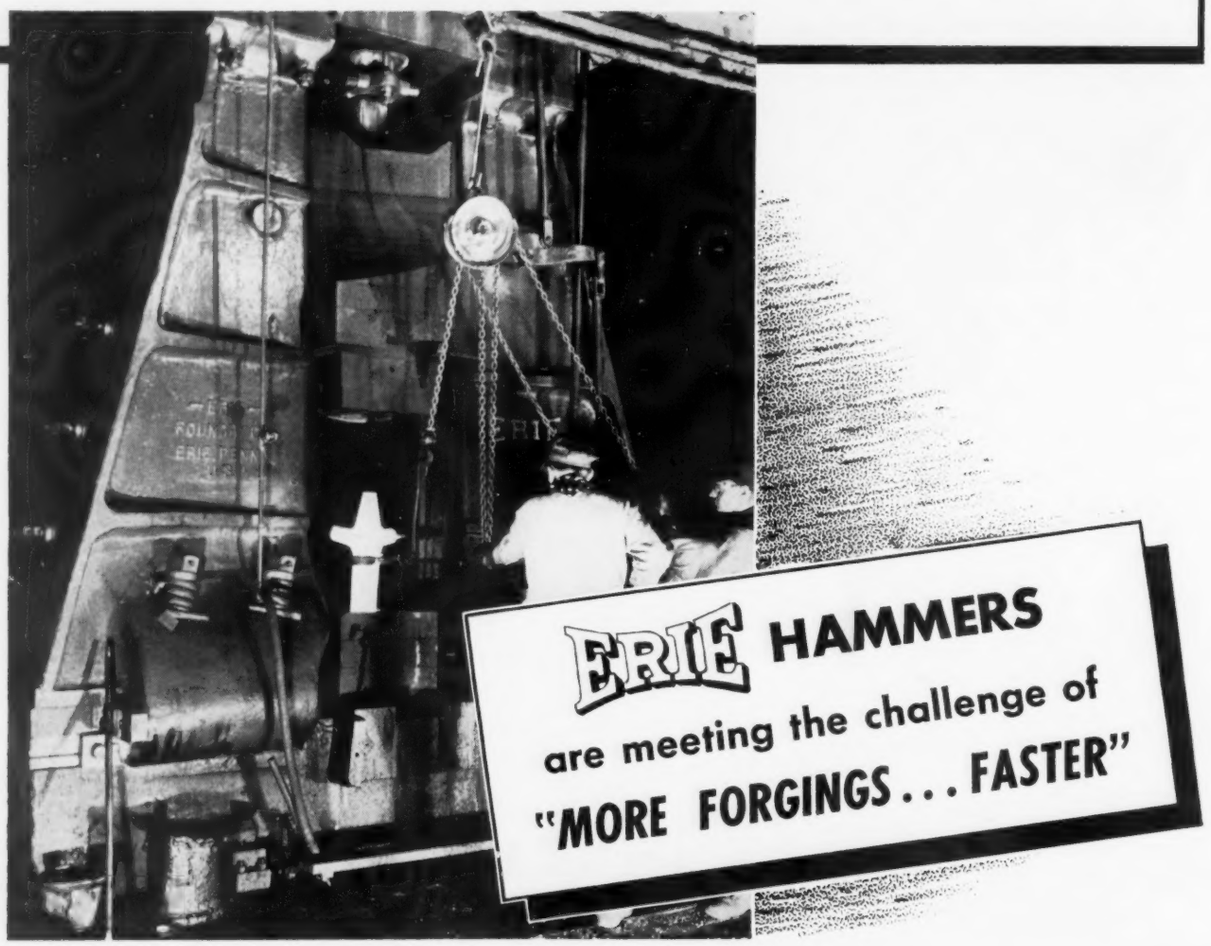
AT PRODUCTION RECORDS



Forging a 215 lb. aeroplane propeller hub on a 12,000 lb. Erie Steam Hammer

THOUSANDS of massive Erie Hammers are establishing new production records in the nation's great forge shops . . . producing more forgings, faster. Erie's rugged design, the concentration of all the force of the blow on the work, and flexibility of control, make the fullest use of the rated hammer capacity and the operator's skill.

To hasten Victory, Erie Foundry is producing Erie Steam and Board Drop Hammers in ever increasing numbers.

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ERIE BUILDS *Dependable* HAMMERS

PLATE EDGE PREPARATION

In Ship Construction

. . . . is greatly facilitated by multiple torch cutting setups

THIRTY THOUSAND men were engaged in welding and cutting in our country's shipyards in 1941, according to recent estimates. If 24,000 of these are employed as welding operators and each deposits metal at an average rate of 20 pounds per shift, the quantity of metal deposited daily adds up to some 480,000 pounds. Yet as recently as 1935, many shipbuilders mistrusted welding as a means of joining hull plating and other essential structural parts of a ship, and would have none of it.

Although a few nearly all-welded ships were built prior to 1936, the strongest real impetus to the welding of self-propelled ocean-going vessels was provided that year when the Sun Shipbuilding & Dry Dock Co. built the virtually all-welded 521-feet 18,500-ton tanker J. W. VAN DYKE for the Atlantic Refining Co. This project included the use for the first time anywhere in shipbuilding of the then new Unionmelt automatic electric welding process.

Accuracy Means Economy

Although the adoption of welding eliminated much of the lay-out work formerly required in the shipyard mold loft, and greatly simplified the preparation of steel for the ship, the cutting of plate edges for welding is as important as proper shearing and punching for riveting construction. Accurate preparation is necessary for structural and for economic reasons. Lap joints can, of course, be used without accurate sizing of plate, but welded lap joints are uneconomical in plate, add useless weight to the ship, increase welding costs and complicate the details of construction so are rarely used in shipbuilding.

Plate-edge cutting focused attention on flame-cutting equipment for cutting and beveling plate edges because of its high speed of production, availability of equipment, low cost of equipment, low cost of power, low investment charges on equipment since major-operating charges are for labor and consumable materials used only during production.

Since cutting flames impose no external loads on the plate, heavy holding clamps, large tool-driving motors, and massive installation foundations are not required. Hand-operated cutting is satisfactory for any but the shortest seams because of irregular edges and bevels. Much plate preparation is now done with blowpipes mounted on small, portable, motor-driven carriages which

From a paper by G. F. Outcalt and J. M. Keir, engineers, The Linde Air Products Co., New York, presented at the annual meeting of the American Welding Society, Philadelphia, October, 1941.

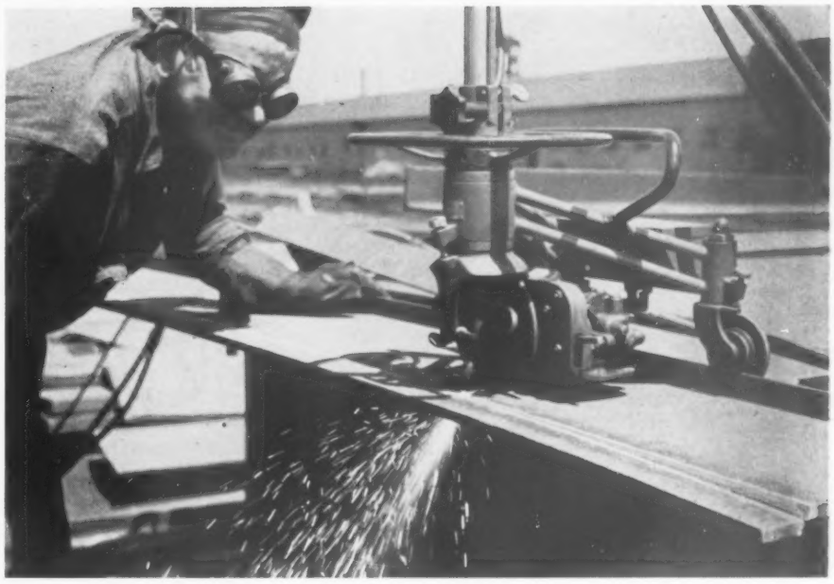


Fig. 1—Typical bevel cutting setup where torch is guided by track or accurately steered by the operator—using one blowpipe

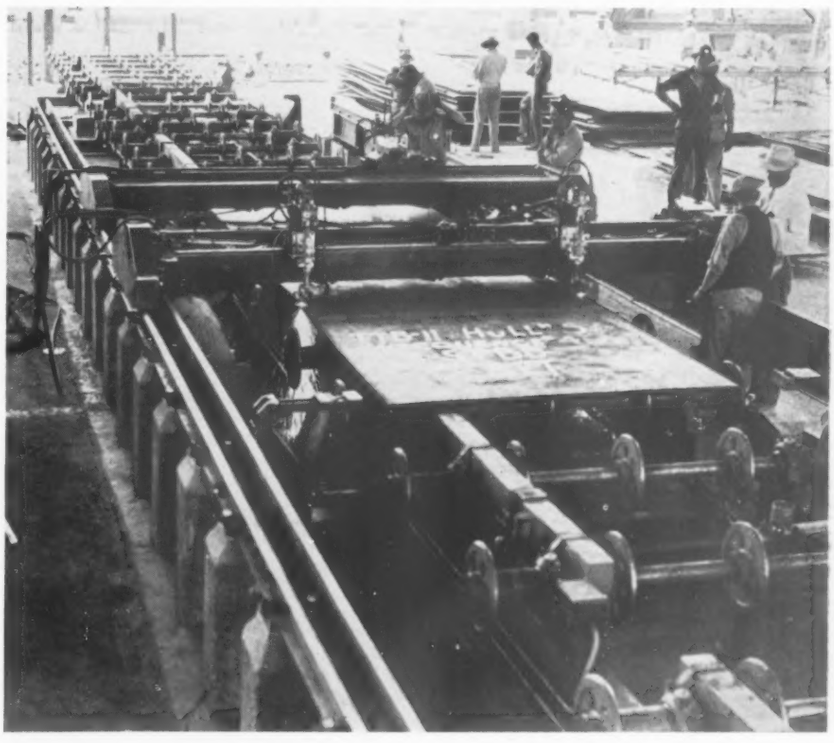


Fig. 2—Multiple head cutting equipment arranged with conveyor traversing devices to obtain high production in cutting and edge preparation

1,000° F., 350,000 LBS. PER SQ. INCH—

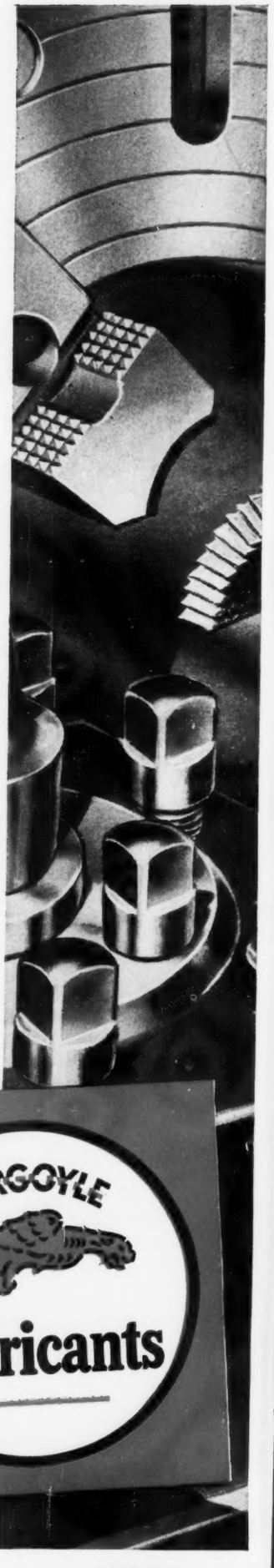
No Time for Guesswork!

A "CORRECT" ANSWER TO TOUGH "LUBRICATION" PROBLEMS IN WARTIME INDUSTRY:

Problem: Look at the cutting job pictured at the right. As that chip spirals away from the work, pressure on the tool may hit 350,000 lbs. per sq. inch! Temperatures may shoot past 1,000° F.! *Yet this job is relatively simple because it is a "roughing" operation.* However, as the need for smooth finish and close tolerances increases, choosing the *right* oil to lubricate and cool the cutting tool becomes more and more difficult.

Answer: You need cutting and soluble oils prescribed to fit the special type of jobs in your plant. The Socony-Vacuum engineer who visits your shop is just the man to make an accurate diagnosis of your needs.

For "roughing" jobs like the one at the right, he will recommend a *good* soluble oil. And for jobs demanding fine finishes and close tolerances, he will offer you a cutting oil specially made by Socony-Vacuum to meet the needs of your specific type of work.



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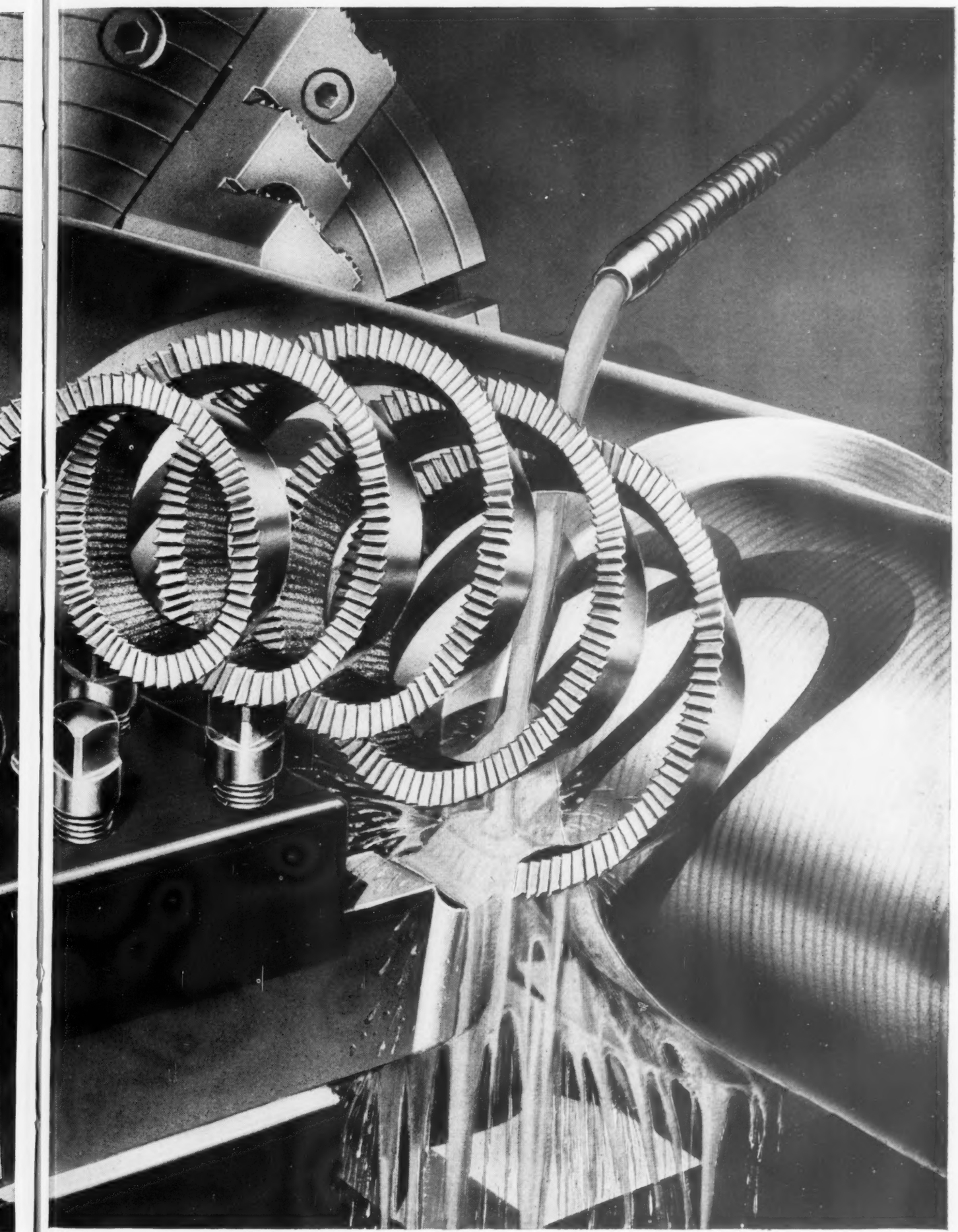


travel in straight or curved paths on portable track or directly on the plate.

Fig. 1 shows a typical unit guided by track or accurately steered by the operator to make cuts almost equal to those obtainable with track guidance.

Many early types of these machines carrying one blowpipe are still in use for cutting plain square edges or single-beveled edges, and are sometimes used for cutting more complicated edge preparations by means of two or three passes. Accuracy in multi-pass cutting is difficult because the tendency of each successive heating and cooling to warp the plate is cumulative, and compensation or correction is practically impossible.

More advanced procedure employs two or three blowpipes or specially connected cutting nozzles so adjusted that the two or three surfaces are cut during one passage of the machine. Most complicated edge preparation is the double-bevel with unbeveled root face. Sequence of cuts for preparing this edge in one pass is shown in Fig. 4. This operation uses less gas than making three separate cuts in three passes, and total heat effect tending to distort the plate is but little greater than that of a single cut.

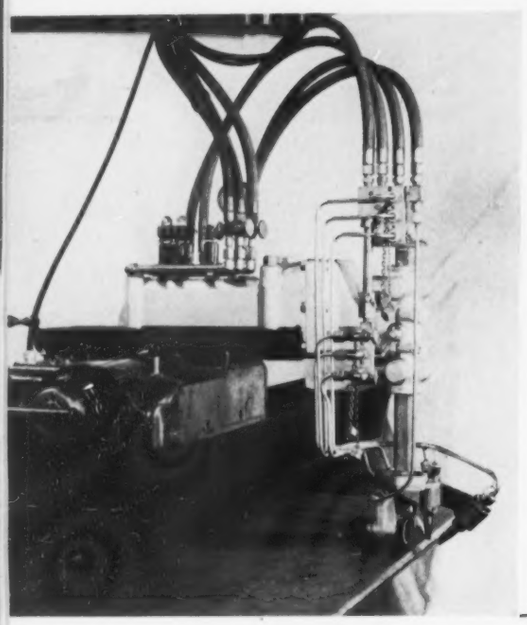
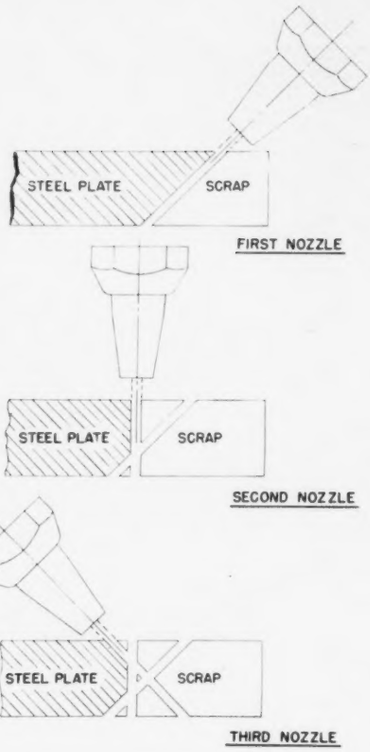


Fig. 3—Automatic head equipped with ignition jet and three cutting torches for multiple cutting at one pass

Fig. 4—This diagram illustrates sequence of three torches which are mounted close together on one fixture to cut the double bevel edge with square portion as shown, with only one pass of the machine



If bevels are to be cut with their top and bottom edges truly straight, the ends of the blowpipe nozzles must travel at exactly uniform distances from the plate surfaces as well as in a plane perpendicular to the plate and parallel with the finished edge. To do this, the blowpipes are arranged to rise and fall so that the distance between nozzles and plate surface remains constant even when cutting a wavy plate. Such a setup is shown in Fig. 3. Cutting nozzles attached to lower end of the vertical shaft are free to move up and down in accurately fitting roller bearings. The floating assembly is supported on a wheel riding directly on the plate surface adjacent to the cut, thus depth of bevel and contour of cut edges are always uniform.

Track, obviously, must be straight and level since any variation in relative height of the two rails would tilt the carriage and change the shape of the cut edges. To provide and maintain accurate track alignment, firm foundations and rigid track mounting are necessary.

In some shipyards, a single straight section of track is installed on a permanent mount and the plate turned for each cut. The total time required here is, of course, the sum of the time required to make the individual cuts around the full periphery of the plate, plus the time for positioning. In other yards, plate handling time and cutting time have been reduced by using an L-shaped track with two machines, one traversing each leg of the L. In this way, two cuts are made at the same time without changing the position of the plate.

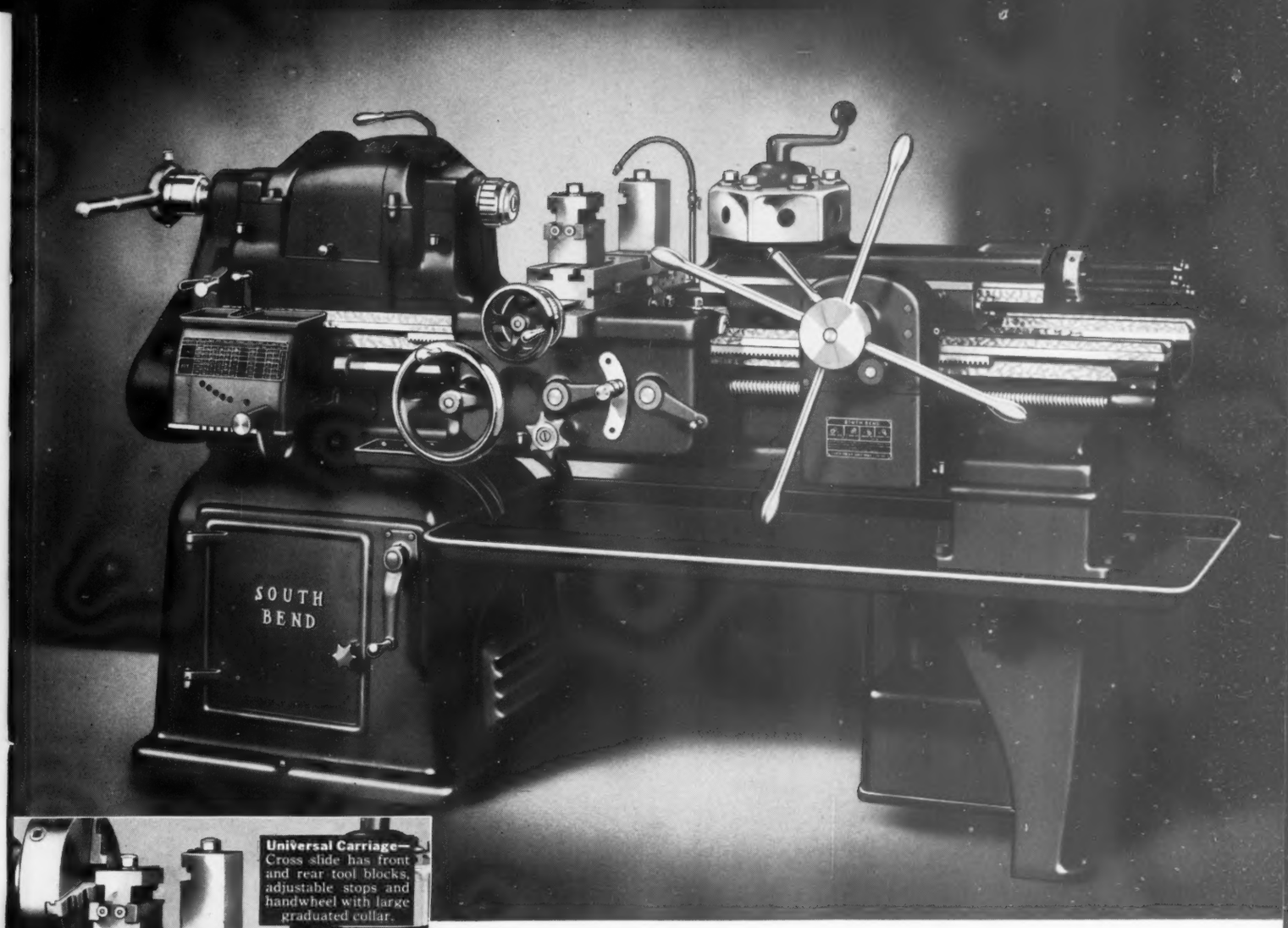
If all plates to be cut are approximately the same size, a 4-track arrangement can be used, but this has not been found practical, and

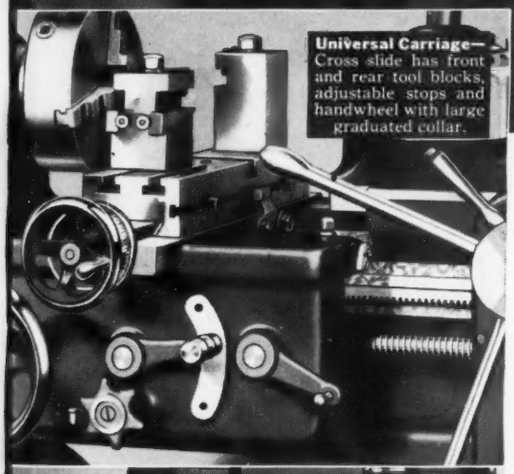
(*Please turn to Page* 110)

TABLE I—Data on Production; Time and Gas Consumption for Flame Cutting Plate

Plate Thickness	Type of Edge Preparation	Approximate Time and Consumption of Gases per 10 Linear Feet of Plate Edge: Cutting Time Minutes	Gas Consumption in Cu. Ft. Oxygen	Acetylene	Approximate Operating Time for Plates of Different Lengths (Minutes)* 16	18	20	22	24	26	28	30	32
¼"	Square Edge	6	7	1.0	9.5	11	12	13.5	14.5	16	17	18	19.5
	Single 30° Bevel	6	9	1.4	9.5	11	12	13.5	14.5	16	17	18	19.5
	Single Bevel and Nose	7	12	2.2	11.5	13	14	15.5	17	18.5	20	21	22.5
	Double Bevel and Nose	..	..	..	....	..	..	....	....	....	....	..	....
½"	Square Edge	7	9	1.2	11.5	13	14	15.5	17	18.5	20	21	22.5
	Single 30° Bevel	7	16	1.7	11.5	13	14	15.5	17	18.5	20	21	22.5
	Single Bevel and Nose	8	19	2.5	13	14.5	16	18	19.5	21	22.5	24	25.5
	Double Bevel and Nose	9	36	6.4	14.5	16.5	18	20	22	23.5	25.5	27	29
¾"	Square Edge	8	16	1.5	13	14.5	16	18	19.5	21	22.5	24	25.5
	Single 30° Bevel	8	21	2.1	13	14.5	16	18	19.5	21	22.5	24	25.5
	Single Bevel and Nose	9	44	4.3	14.5	16.5	18	20	22	23.5	25.5	27	29
	Double Bevel and Nose	9	48	6.4	14.5	16.5	18	20	22	23.5	25.5	27	29
1"	Square Edge	9	19	1.7	14.5	16.5	18	20	22	23.5	25.5	27	29
	Single 30° Bevel	9	24	2.4	14.5	16.5	18	20	22	23.5	25.5	27	29
	Single Bevel and Nose	10	56	5.0	16	18	20	22	24	26	28	30	32
	Double Bevel and Nose	10	61	8.3	16	18	20	22	24	26	28	30	32

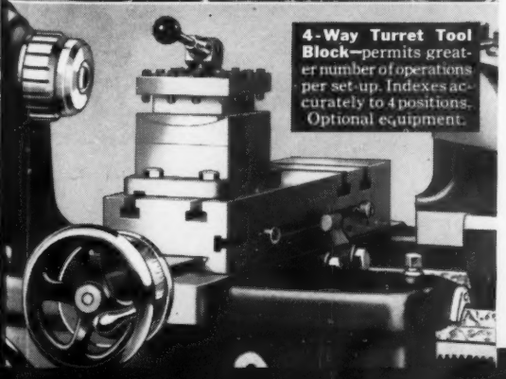
*Cutting of long edges governs overall cutting time. Since both of these are made simultaneously by movement of the same carriages, the time of travel of this carriage is equal to the overall production time of cutting all four edges of a plate.





Universal Carriage—Cross slide has front and rear tool blocks, adjustable stops and handwheel with large graduated collar.

Gear Box—provides 48 power cross and longitudinal feeds for universal carriage, 48 threads and 48 power turret feeds.



4-Way Turret Tool Block—permits greater number of operations per set-up. Indexes accurately to 4 positions. Optional equipment.

SOUTH BEND TURRET LATHES

DESIGNED for the efficient production of duplicate parts, the South Bend No. 2-H Turret Lathe has the precision for exacting, close-tolerance operations—smooth power for producing a fine finish—versatility that reduces set-up time to a minimum.

The universal carriage has 48 power cross feeds, 48 power longitudinal feeds, and 48 thread cutting feeds ranging from 4 to 224 per inch. All changes are made through the quick change gear box at the headstock end of the lathe. Front and back tool blocks are supplied on the screw feed cross slide. A 4-way turret tool block is available to order. A large diameter micrometer graduated collar on the cross slide handwheel permits adjusting the cutting tools with extreme accuracy.

The ram-type turret has both power feed and hand feed, with an adjustable feed trip and stop for each of the six turret faces. The turret head indexes automatically on the return stroke of the turret slide. The quick change gear box provides 48 changes for power turret feeds. Change gears in turret apron provide an additional change for turret power feed, independent of tool post carriage feeds in both rate and direction.

Full advantage can be taken of the higher cutting speeds possible with tungsten-carbide tools, as the result of the wide range of speeds and feeds available. The twelve spindle speeds range from 16 to 880 R.P.M. The use of a two-speed motor permits quick change from high to low speeds for reaming and tapping operations.

Investigate the possibilities of this new South Bend Turret Lathe—write for catalog and the name of our nearest dealer.

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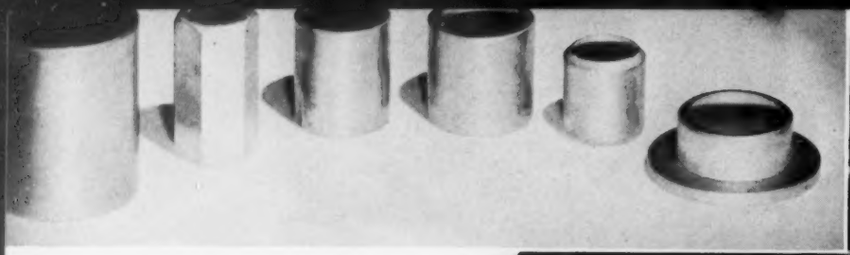

Fig. 1. (Directly above)—Group of Durex bearings made from powdered iron, compacted and sintered. These units replace bronze bearings, the substitution saving valuable copper and tin

Fig. 2. (Right)—Entrance end of continuous roller-chain-hearth furnace in which powdered metal compacts are sintered at temperatures up to 2050 degrees Fahr. Note work table at almost same level as conveyor. This speeds handling of the work and positioning it on conveyor

SUBSTITUTES

Iron Powder for Bronze

Further conservation made by processing scrap iron to produce the pure iron powder employed in making the powdered iron compacts

THE HUGE amounts of copper and brass required in ordnance work have necessitated a detailed study of every possible means of reducing or eliminating copper from other goods. The stoppage of tin imports means the tin content in bronze must be conserved too. In the field of sleeve bearings, long popular for many electric motors and machines of various types, the substitution of powdered iron compacts for bronze thus is becoming increasingly important. Similar substitutions of powdered iron compacts for bronze in other applications or for other strategic metals are expected to develop with continued improvement in the technique of powder metallurgy.

Fig. 1 shows a group of Durex sleeve bearings made from iron powder and suitable for use as substitutes for bronze bearings in a wide range of applications. The peculiar structure of powdered iron compacts appears particularly suitable for bearing applications for it contains pores which may carry considerable residual graphite to improve the self-lubricating properties. Pores also retain a certain amount of lubricating oil.

To the pure iron powder a small percentage of carbon is usually added so the resulting structure resembles high-carbon steel. Fig. 3 is a photomicrograph of such a material showing alternate layers of iron and carbides. The light areas are the iron and the dark areas the carbides, while the black patches are pores in the metal. Durex iron usually contains about 1 per cent combined carbon as well as the residual graphite usually found in the pores.

By ARTHUR F. MACCONOCHIE
Head, Department of
Mechanical Engineering
University of Virginia
University Station, Va.
And
Contributing Editor, STEEL

Some 2 per cent of graphite is added to the iron powder to supply the needed carbon for sintering and to lubricate the dies during briquetting.

Depending upon the briquetting pressure used, the pores may be from 5 to 30 per cent of the total volume of the material. Of course the technique of forming the powdered metal compact greatly influences not only the porosity of the material but also its other physical characteristics. Too, the sintering of metal powders compacted in a press under high pressure produces certain desirable internal structures that are not obtainable by more common methods such as casting.

There is a rather general impression that the bond between the particles of a part fabricated by powder metallurgy is the result of partial fusion engendered by heat. As a matter of fact, the partial union which takes place as a result of the application of heat and pressure (regardless of whether they are applied simultaneously or separately) is due to atomic surface forces which are not dependent upon temperature at all in the ordinary sense. While heat does increase the mobility of the atoms and so promotes their diffusion across the contact faces, it has been shown that the cool sheared surfaces of various metals such as copper, tin, zinc, lead and the like will adhere strongly when

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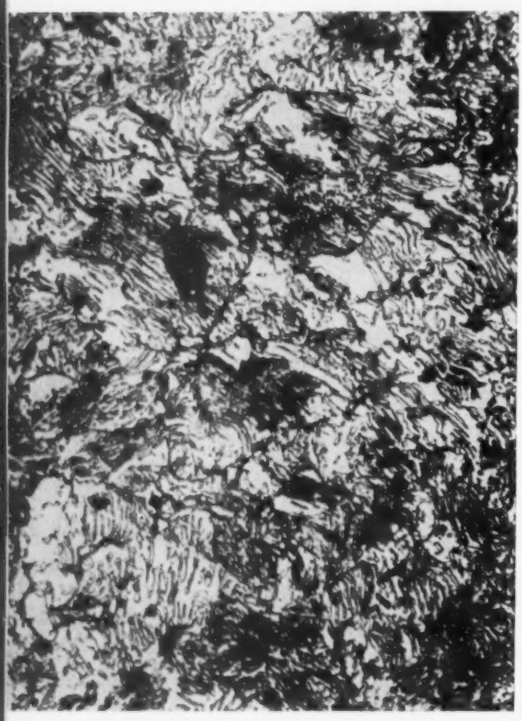
pressed together, whether like or unlike metals are involved. Clean surfaces of optically flat glass behave in a similar fashion.

From the practical standpoint of turning this phenomenon to account, considerable attention has been devoted to the influence of the size and shape of the particles which give the best results in any particular case. However, this still appears to rest upon an empirical basis. Further, good results appear to have little relation to the particular mode of preparing the powder since mechanical methods (including milling, machining, granulation and the like) and chemical methods (such as reduction, precipitation and electrolytic deposition) are in use.

It is known, however, that the density of the compact is related to the tendency of the powder to fill up a void. This in turn depends on particle size and shape. Also it is known that the strength of the part is proportional to the bonded area and to the "keying" effect of the particles.



As far as the technique of heat and pressure application is concerned, we observe that friction tends to limit the depth to which the effect of the pressure penetrates, this limitation being offset by such devices as tapered or relatively shallow molds; while heat promotes the absorption or evolution of gas-vapor films present in solution or residing on the surface in an adsorbed state. In order that the necessary intimate contact between the particles may be secured, such films as may be in equilibrium with the metal itself or which may be due to the presence of volatile constituents in the compact must be eliminated by a proper combination of pressure (which tends to trap them) and heat (which tends to drive them off).

In the manufacture of oilless bearings, volatile constituents may be deliberately introduced in order to form many capillary pores throughout the bearing into which oil can seep and act as a reservoir of lubricant when the bearing is at work. Further, the degree of porosity can be controlled within close limits in order that the bearing may not only have the desired lubricating properties but at the same time possess the necessary resistance to wear. This same principle may be applied to other items such as oil pump gears where the ability to retain lubricant coupled with an ability to develop a smooth surface promotes silence and efficiency in operation.

In the manufacture of gears by the use of iron powder, the Moraine Products Division of General Motors employs a Swedish iron powder which has been prepared directly from the ore by reduction, without at any time being subjected to melting temperatures. With Swedish sources closed, a high-purity iron powder is now being obtained by treating low-carbon steel scrap, subsequently pulverized in a ball mill and decarburized in a controlled-atmosphere furnace. The resulting particles are very soft as well as exceptionally uniform in size and quality.

The powder is pressed into steel molds which have been given a high finish within close limits. In powder metallurgy, briquetting is the basis operation. Compacting the iron powder under pressures up to 60,000 pounds per square inch or more, the dies must have exceptionally close control of clearances if the compacts are to be uniform and of high quality. Die clearances are in the order of 0.0005-inch or less. Oil hardening steel is usually employed as the die material.

After briquetting, the compact is sintered at temperatures up to 2000 degrees Fahr. in the type of furnace shown in Fig. 2, in which the parts

(*Please turn to Page* 117)

New Handbook

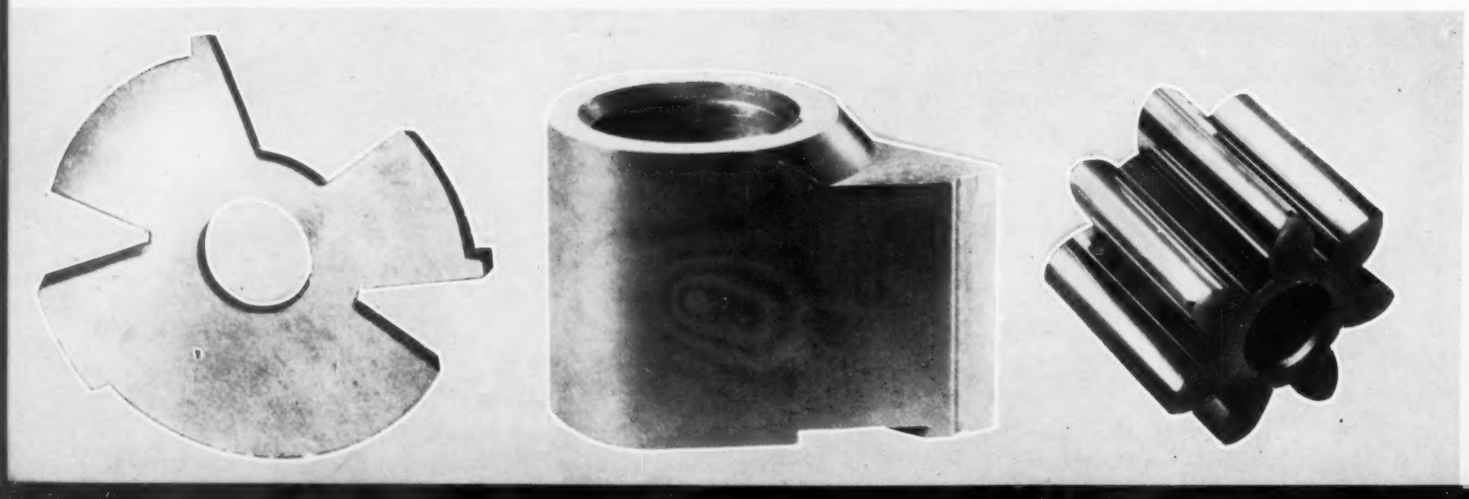
The latest in STEEL's series of ordnance handbooks, "Modern Small Arms", is now off the press. This handbook includes information on various types of automatic rifles, machine guns and sub-machine guns, automatic firearms, cartridge cases and small arms ammunition. It is attractively bound, contains 70 pages, and is priced at $1.00 per copy.

Also available are copies of "Modern Shell Production, Revised" at $1.50 per copy and "Modern Gun Production" at $1.00 per copy.

These handbooks may be ordered separately at the above price, or $3.00 for the set from STEEL, Readers Service, Penton building, Cleveland.

Fig. 3. (Left)—Micrograph of powdered metal compact exhibits alternate layers of iron and carbides, the light areas being the iron; the dark, the carbides. Black patches are pores which contain some free graphite

Fig. 4 (Below)—Various parts made from powdered iron. Gear has been burnished to give the high finish. Parts such as these are compacted in automatic presses at high production rates



INDUSTRY ANSWERS THE CALL!

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★ From the United States Treasury Department ★

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1. It provides immediate cash now to produce the finest, deadliest fighting equipment an Army and Navy ever needed to win. 2. It gives every American wage earner the opportunity for financial participation in National Defense. 3. By storing up wages, it will reduce the current demand for consumer goods while they are scarce, thus retarding inflation. 4. It reduces the percentage of Defense financing that must be placed with banks, thus putting our emergency financing on a sounder basis. 5. It builds a reserve buying power for the post-war purchase of civilian goods to keep our factories running after the war. 6. It helps your employees provide for their future.

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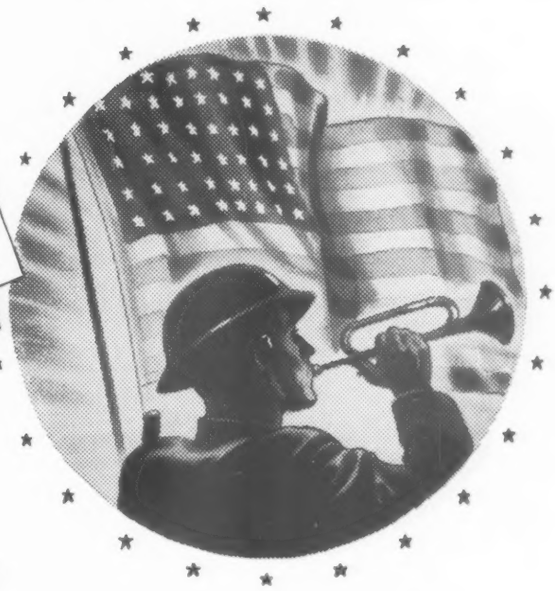

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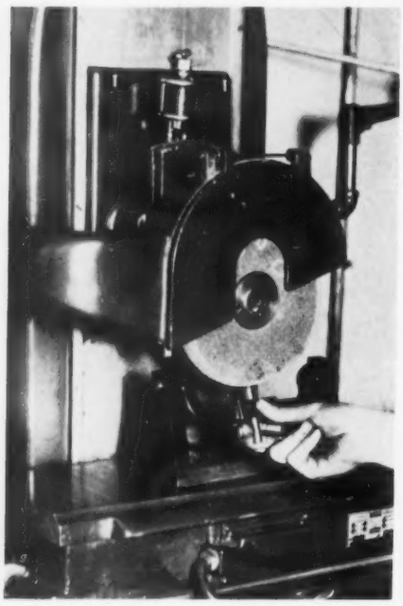
Radius Dresser

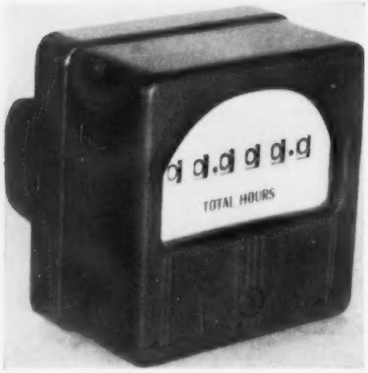
George Scherr Co. Inc., 128 Lafayette street, New York, is now offering on the market a Little Won-



der radius dresser to simplify the dressing of grinding wheels for various types of grinding work. It is used in conjunction with a diamond tool, and will dress either convex or concave radii from 0 to 1 inch. It can be set with a regular 1-inch micrometer, depth micrometer or height gage. Base of the device is of cast iron especially alloyed, rough machined and normalized before finishing. The swinging arm is of heat treated cast iron. Centers are turned at both points and sides hardened and lapped true.

Checking Meter

Westinghouse Electric & Mfg. Co., East Pittsburgh, Pa., has developed a new meter to check production and machine tool life in industrial plants to indicate elapsed time in minutes or hours. It consists essentially of a synchronous driving motor, a gear train and six numbered wheels. The motor operates at 600 revolutions per minute on a 115-volt, 60 cycle circuit. Synchronous operation is not affected by voltage variations of from 75 to 125 per cent of rated value. Life time bearing lubri-



cation is provided by an oil storage reservoir. To operate, the meter is connected in parallel with the apparatus of which total hours of operation are to be measured. Meter circuits are closed when the machine operates, causing the synchronous motor to run continuously.

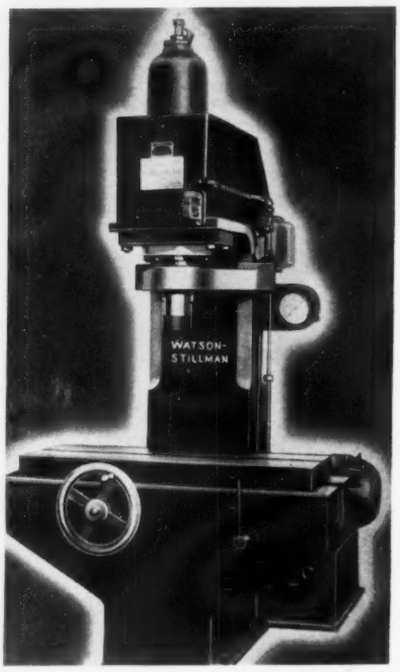
Rock Drill

Ingersoll-Rand Co., Phillipsburg, N. J., announces the addition of a D-505 drifter to its line of rock drills said to be the fastest unit produced by the company. Tests have shown its efficiency, based on inches drilled per cubic feet of air at 90 pounds pressure, is 34 per cent greater than the company's 4-inch bore machine; the wall section of the fronthead is 10 per cent thicker; the shank aligner is 18 per cent longer and 8 per cent thicker; and the chuck design is of heavier construction. The design of the piston-stem cushion bearing permits a heavier metal section in the cylinder and

furnishes better support. A port on each side of the cylinder balances the piston within the cylinder. Air to the front end of the cylinder passes directly between the ratchet and the head of the rifle bar. It is unrestricted by small ports which assures good hole-cleaning and aids in supplying constant lubrication to all moving parts. The throttle handle is readily accessible and is protected by the backhead.

Straightening Press

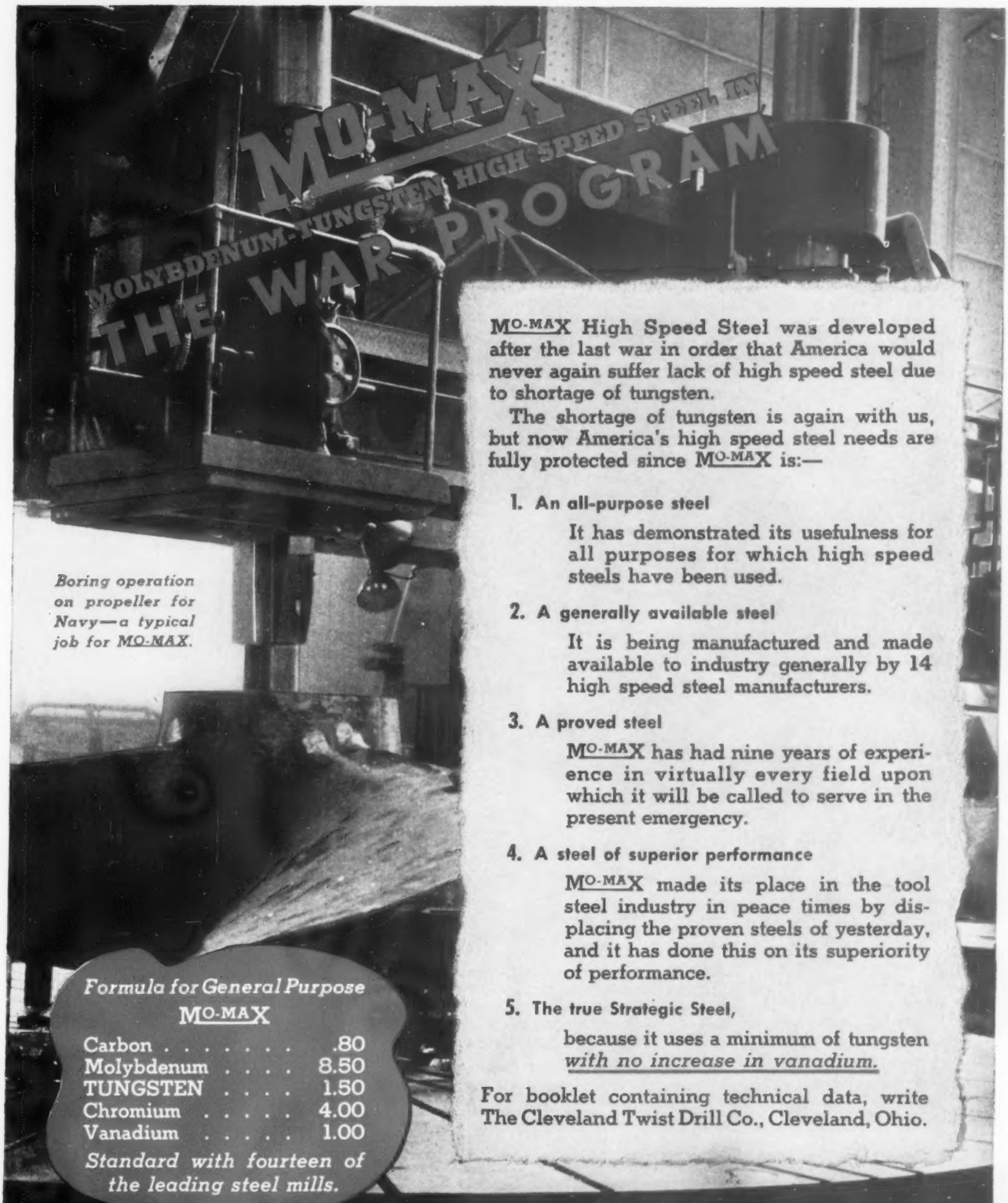
Watson-Stillman Co., Roselle, N. J., is placing on the market an improved 50-ton straightening press for straightening rods, bars, tubes and structural shapes. It features a 20-inch opening, 14-inch stroke and 12-inch gap. Through use of a man-



ually movable work table 4 feet long and 14½ inches wide, with a travel of 24 inches governed by a large handwheel, work can be quickly positioned. Advance speed of the unit is 109 inches per minute, its pressing speed 18 inches per minute, and return 90 inches per minute. A hand lever controls the operation. The machine takes up 5 x 4½ feet of floor space.

Milling Machine

Reed-Prentice Corp., Worcester, Mass., is placing on the market an improved No. 4 vertical miller. One of its improvements consists of a new type sheet metal cover, 0.015-inch thick, which is designed to prevent dirt and chips falling in the ways. Thus, when the table travels to one end or the other of the bed, the way cover slides in a special track provided at each end. Column of the miller houses the hydraulic units in its base and carries the cross slide on wide ways which are pressure lubricated. The



Boring operation on propeller for Navy—a typical job for MO-MAX.

MO-MAX High Speed Steel was developed after the last war in order that America would never again suffer lack of high speed steel due to shortage of tungsten.

The shortage of tungsten is again with us, but now America's high speed steel needs are fully protected since MO-MAX is:—

1. **An all-purpose steel**

   It has demonstrated its usefulness for all purposes for which high speed steels have been used.

2. **A generally available steel**

   It is being manufactured and made available to industry generally by 14 high speed steel manufacturers.

3. **A proved steel**

   MO-MAX has had nine years of experience in virtually every field upon which it will be called to serve in the present emergency.

4. **A steel of superior performance**

   MO-MAX made its place in the tool steel industry in peace times by displacing the proven steels of yesterday, and it has done this on its superiority of performance.

5. **The true Strategic Steel,**

   because it uses a minimum of tungsten *with no increase in vanadium.*

For booklet containing technical data, write The Cleveland Twist Drill Co., Cleveland, Ohio.

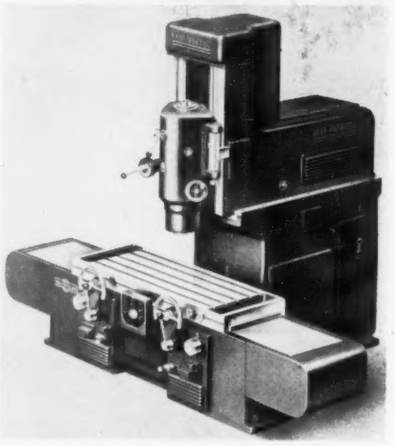
Formula for General Purpose
MO-MAX

Carbon	.80
Molybdenum	8.50
TUNGSTEN	1.50
Chromium	4.00
Vanadium	1.00

Standard with fourteen of the leading steel mills.

"LMW"	Alleghany Ludlum Steel Co.	"Molite 8"	Columbia Tool Steel Company	"Tatmo"	Latrobe Electric Steel Co.
"Mohican"	Atlas Steels, Ltd.	"Rex-T-Mo"	Crucible Steel Co. of America	"S.T.M."	Simonds Saw and Steel Co.
"Bethlehem HM"	Bethlehem Steel Company	"Di-Mol"	Henry Disston & Sons, Inc.	"Mo-Tung"	Universal-Cyclops Steel Corp.
"Mo-Cut"	Braeburn Alloy Steel Corp.	"Rex-T-Mo"	Halcomb Steel Co.	"Vul-Mo"	Vulcan Crucible Steel Co.
"Star Max"	Carpenter Steel Co.	"Mogul"	Jessop Steel Company		

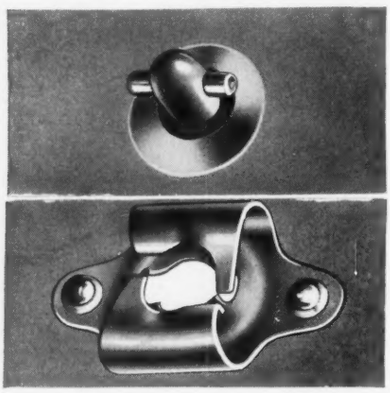
vertical head carries a spindle mounted on widely spaced roller bearings at the nose, providing great rigidity, and a double row of taper roller bearings on the upper end, mounted to allow for axial expansion or contraction of spindle. A spindle lock is built into head and is so designed that spindle cannot be started unless lock is released. A motor on top of the cross slide provides rapid traverse to the head, up or down, and is controlled from a push button panel. The turret stop has four positions with adjustable dogs in each. Built-in pump supplies a cascade of oil to all gears and bearings. Nine speed changes are provided in the gear box. These are controlled from one lever on the side of cross slide. Lever to the right of operator, connected to a hydraulic motor, controls the feed and rapid traverse of the table in both directions, the upright position of lever being the stop position. Any feed rate in the range from ½ to 37 inches per minute is available. The rapid traverse rate is 190 inches per minute. The airplane type handwheel is a separate control, connected with the same hydraulic motor, to operate the table at feed rates up to 10 inches per minute, regardless of the setting of the feed selector dial. A duplicate set of controls to the left of the operator, connected to another hydraulic unit, is used to control the cross slide. Operation of table and cross slide is through



a leadscrew operated from hydraulic motors. The electric motors for the spindle drive and feeds, also vertical traverse motor for head, are centrally controlled.

Cowling Fastener

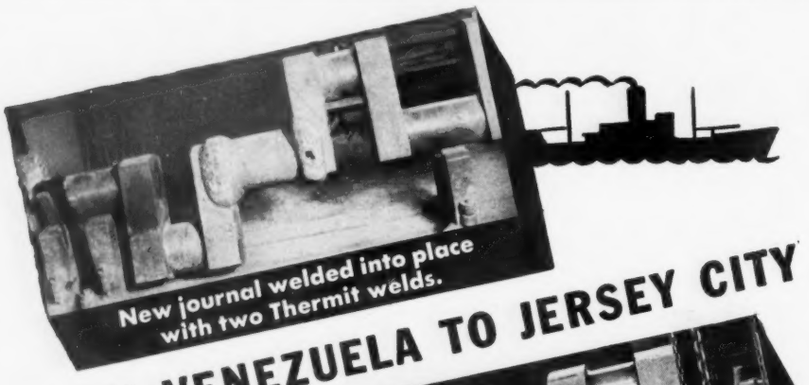
United-Carr Fastener Corp., 29 Ames street, Cambridge, Mass., has developed a new Airloc fastener for use on aircraft engine cowlings, hand hold covers, fairings and many other similar applications. It consists of two primary parts—a stud and a stud receptacle. According to tests it has great strength in



tension, minimum deflection between the sheets, high shear strength. It does not require close tolerances on members to be joined. The fastener also can be used on any combination of thicknesses.

Line Purifier

Centrifix Corp., 3029 Prospect avenue, Cleveland, has introduced an improved line purifier for removing oil from exhaust steam and dirt, oil and water from compressed air. As the vapor travels into the



FROM VENEZUELA TO JERSEY CITY for THERMIT REPAIR..

This 9-inch diameter, four-throw Crankshaft broke in a Venezuelan plant. Knowing the speed and economy of the Thermit process, the management shipped the crankshaft over 2000 miles to Jersey City, where it was Thermit welded and re-shipped to South America.

For over 40 years, Thermit welding has been saving valuable production hours by putting large broken parts back to work in a few days—instead of the weeks or months needed to replace them.

Savings of several thousand dollars over replacement costs are not infrequent.

Thermit welding also has many advantages for fabrication of large, heavy parts. Preparatory work is simple, there is no manipulation or "positioning" and large, expensive castings are eliminated in favor of small forgings or flame-cut shapes.

Booklet, "Thermit Welding," sent on request.

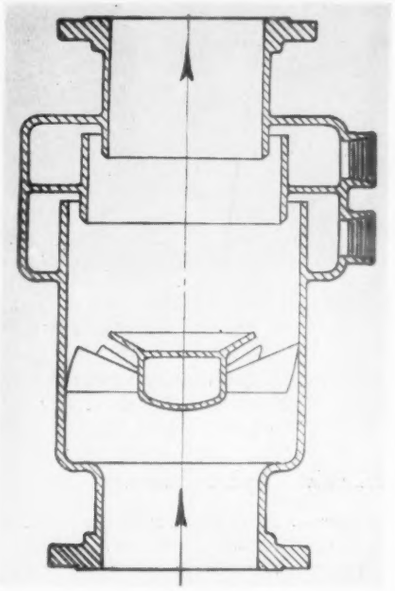
Specialists in welding for nearly 40 years. Manufacturers of Murex Electrodes for arc welding and of Thermit for repair and fabrication of heavy parts.

THERMIT WELDING

METAL & THERMIT CORP., 120 BROADWAY, NEW YORK, N. Y.

ALBANY • CHICAGO • PITTSBURGH • SO. SAN FRANCISCO • TORONTO

unit it passes through the stationary radial tuyere, the vapor and entrainment being given a whirling action that centrifugally throws the entrainment to the inner walls of the purifier. The forward motion of the vapor along with its spiral action continually wipes the entrainment toward the annular slots leading into the two eject races. The entrainment has no chance of re-entering the va-



por stream after it is once thrown out to the inner walls. Efficiency of the unit is said to be close to 100 per cent.

Eye Shade

Edroy Products Co., 480 Lexington avenue, New York, is offering a new Magni-Focuser eye shade for use by mechanics, engravers, doctors, dentists, chemists, photograph-

ers, tool and die makers. It is equipped with a pair of stereoscopic 5-power magnifying lenses, which by a slight tilt of the head the subject is brought into focus greatly magnified. The wearer when not using the lenses can readily look beneath the shade with his normal

Less Fatigue • Power Driving • Fewer Operations = 50% Less Assembly Cost with Phillips Screws

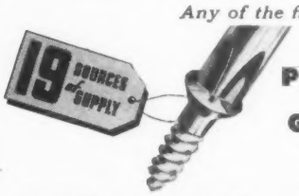
Yesterday — slow, painstaking slotted screw driving with plenty of muscle and plenty of care to see that the driver blade stayed in the slot. Plus plenty of time per assembly charged on the cost sheet.

Today — fast driving with the Phillips Screw that clings to the driver and prevents driver slippage. Faster driving methods are safe — more jobs where electric and pneumatic drivers can be employed. In the average case, Phillips Screws cut assembly time *in half!*

Add up the savings—this 50% reduction in time, the better work done by men less fatigued, the elimination of extra operations (including refinishing scratched surfaces), the freedom from crooked screws and split screw heads—and you'll find you have a 50% saving in assembly *cost* as well as valuable assembly *time*.

Please your men and your cost accountant by changing to Phillips. They are easy as pie to drive — and make every assembly dollar do twice the work.

Any of the firms listed below will tell you more



PHILLIPS RECESSED HEAD SCREWS
GIVE YOU 2 for 1 (SPEED AT LOWER COST)

WOOD SCREWS • MACHINE SCREWS • SHEET METAL SCREWS • STOVE BOLTS • SPECIAL THREAD-CUTTING SCREWS • SCREWS WITH LOCK WASHERS

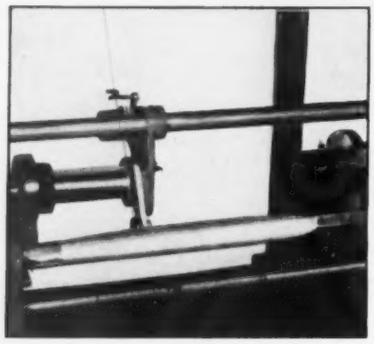
U. S. Patents on Product and Methods Nos. 2,046,343; 2,046,837; 2,046,839; 2,046,840; 2,082,085; 2,084,078; 2,084,079; 2,090,338. Other Domestic and Foreign Patents Allowed and Pending.

American Screw Co., Providence, R. I.
The Bristol Co., Waterbury, Conn.
Central Screw Co., Chicago, Ill.
Chandler Products Corp., Cleveland, Ohio
Continental Screw Co., New Bedford, Mass.
The Corbin Screw Corp., New Britain, Conn.
International Screw Co., Detroit, Mich.
The Lamson & Sessions Co., Cleveland, Ohio
The National Screw & Mfg. Co., Cleveland, Ohio
New England Screw Co., Keene, N.H.
The Charles Parker Co., Meriden, Conn.
Parker-Kalon Corp., New York, N.Y.
Pawtucket Screw Co., Pawtucket, R.I.
Pheoll Manufacturing Co., Chicago, Ill.
Russell, Burdsall & Ward Bolt & Nut Co., Port Chester, N.Y.
Scovill Manufacturing Co., Waterbury, Conn.
Shakeproof Inc., Chicago, Ill.
The Southington Hardware Mfg. Co., Southington, Conn.
Whitney Screw Corp., Nashua, N.H.

vision. It also affords him the use of both hands. The eye shade is of plastic, affording protection to the eyes of the wearer from flying parts of steel or shavings.

Inspector's Hammer

New Method Steel Stamps Inc., 145 Jos. Campau, Detroit, offers a new all-steel inspector's hammer in which the stamps can be interchanged easily. It is designed for continuous service and weighs only 1 pound. Its shank is forged integrally with the head, extending through the handle. Both head and shank are finished on all surfaces. Handle of the hammer is of compressed rawhide, heavily lacquered. The stamp is held in place by a standard size flush-type set screw turned by a wrench supplied with hammer for this purpose. Practically any character design may be had for the interchangeable stamps, including symbols, letters, numerals, insignia, trade marks, etc., with or without borders. The hammer is available with head drilled for round stamps ranging from ⅛ to ⅜-inch diameter inclusive. All stamps are bevel-end to prevent chipping or breaking down the marking characters during severe usage.



FIDELITY Quill Winder..

Accurate Taper Winding of Wire for Weaving of Wire Cloth for FILTERS · SCREENS · SIFTERS, etc.

The FIDELITY Quill Winder for accurate, high-speed taper winding of wire—six packages of uniformly even lay and taper at one time—speeds production for manufacturers of wire cloth for filters, screens, sifters, etc.

The taper is automatically governed by control buttons which reverse and successively shorten the traverse in the same operation.

Slow acceleration prevents wire stretching and breakage. Other outstanding advantages include: hydraulic control, individual motor drive, tension control on feeder, and automatic stop motion and yardage meter.

You can wind wire from spools or brake-controlled reels depending on your requirements.

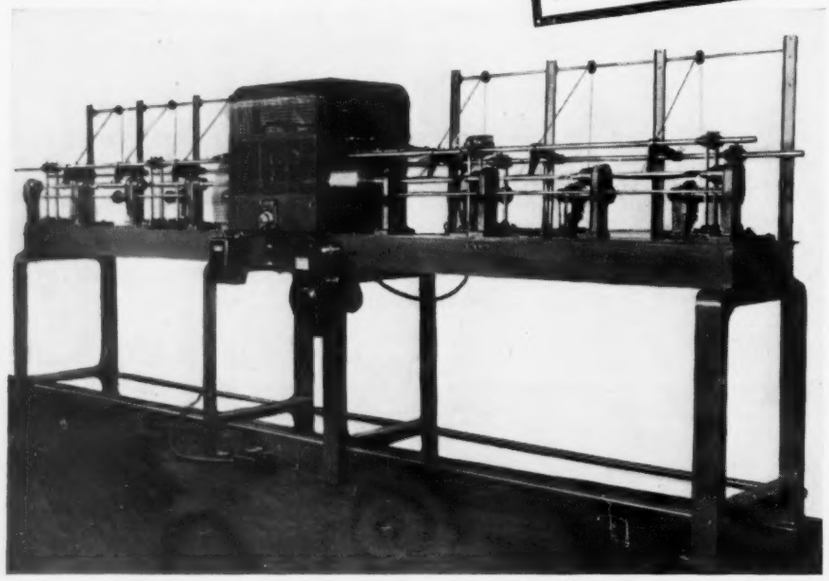
For further information and details, write to

FIDELITY MACHINE COMPANY

3908-18 Frankford Avenue, Philadelphia, Pa.

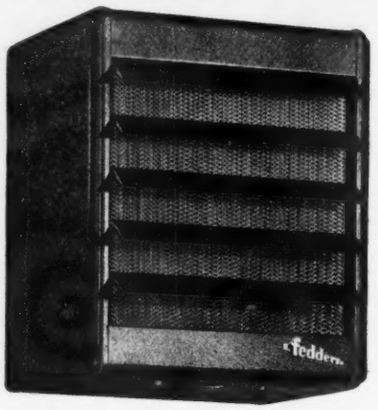
Specifications
FIDELITY QUILL WINDER

1. Spindle speed, 1750 R.P.M.
2. Six quills wound simultaneously
3. Maximum traverse, 10 inches
4. Dial control for traverse changes
5. Automatic stop motion
6. Automatic angular winding attachment
7. Automatic yardage meter
8. Winds from either spools or reels
9. Push-button control
10. ¾ HP motor
11. 2' x 13½' floor space



Unit Heater

Fedders Mfg. Co., Buffalo, has introduced a new line of series 4 Lo-Temp unit heaters which operate on steam pressures up to 150

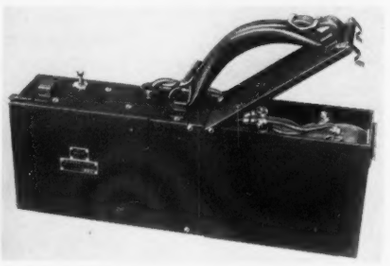


pounds. Units in the line embody latest type tubes and wide blade fans.

Some twelve capacities ranging from 75 EDR to 1200 EDR are offered in the line.

Black Light Lamp

Ultra-Violet Products Inc., 5205 Santa Monica boulevard, Los Angeles, announces a new model Mineralight ultra violet ray black light lamp for identifying the tungsten ore Scheelite, as well as other minerals which also fluoresce under black light. Designated as model No. 564, it operates with a cell in a built-in compartment, and features a built-in regular flashlight in addition to the black light lamp. A



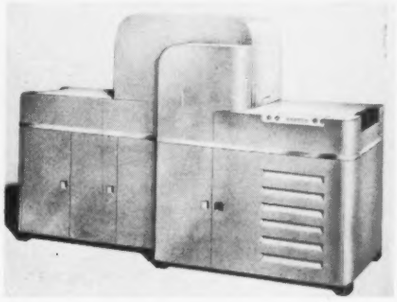
double contact switch enables the use of either light. The unit is portable, weighing 7½ pounds, including two 6-volt type lantern batteries.

It is said to detect Scheelite as far as 10 feet away. A collection of 20 labeled minerals also is supplied with each lamp for the benefit of the user.

Labeling Machine

Designers for Industry Inc., Terminal Tower, Cleveland, announces a new, improved labeling machine for applying labels directly to cans, bottles and other containers. Called the Kiloprint, it automatically prints

from one to four colors directly on the containers, using a new principle of printing (direct plate to article) and specially developed inks. Two special synthetic gum plates for each color desired are used on the ma-

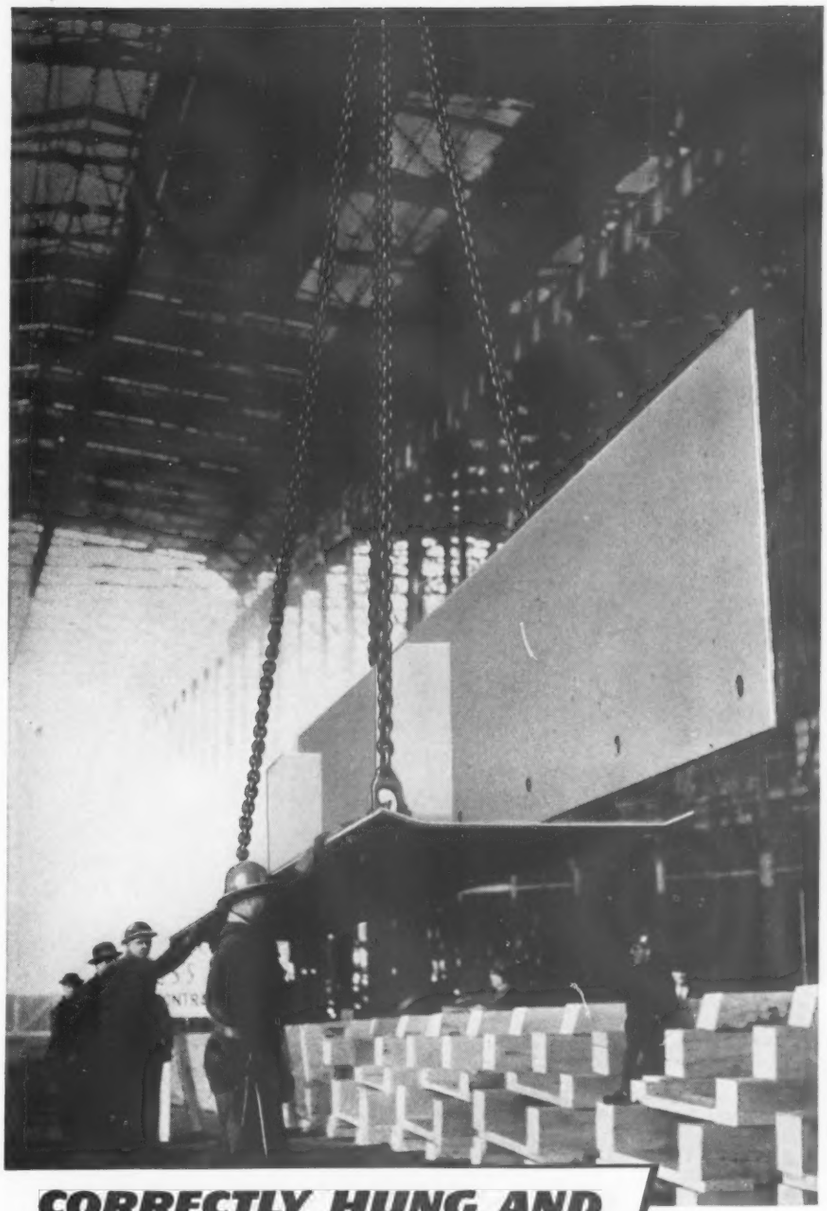


chine. In addition, a special cold color ink, antiacid, noncorrosive and antialkali, enables each color to harden instantly. The device has a continuous output of 50 to 100 articles per minute. The machine, which weighs about 2000 pounds, incorporates an "electric eye" to prevent it from printing on the seam of a can. It also is adjustable for different sizes of shell, cans or bottles. The size of the container may vary from 2 to 14 inches in length, and from 2 to 5 inches in diameter.

Industrial Shop Truck

Buda Co., Harvey, Ill., announces a new Chore Boy all steel 1½-ton industrial shop truck for aiding and speeding up the delivery of tools, material to and from production machines. Weighing only 800 pounds, the truck will carry a 1000-pound load. Arrangement of its 12.8 square feet of deck space permits it to carry conveniently bulky material, tote boxes or long

bar stock. The truck is fast, with quick acceleration and foot throttle control, maximum speed being 15 miles per hour. Power is furnished by 7.7-horsepower, air-cooled 4-cycle engine which gives a mileage of 35 to 38 miles per gallon of gas. Brake is of the internally expanding type on intermediate shaft and is applied with standard brake pedal. Truck will not operate when driver is off seat as the brake



CORRECTLY HUNG AND

PROPERLY CARED FOR

★ *The chain here being used to lay the keel of a fighting ship will last a long time. For it is* **adequate** *to the load. It is* **correctly hung.** *It has been* **properly cared for.** *Such intelligent use of chain pays ample rewards in the conservation of the lives of men, of valuable materials and the chain itself.*

If you wish counsel on how to use your chain safely, economically and profitably, we shall be happy to give you the boiled-down experience of years of chain manufacture, application, maintenance and repair.

AMERICAN CHAIN DIVISION • YORK • PENNSYLVANIA

AMERICAN CHAIN & CABLE COMPANY, Inc.
BRIDGEPORT • CONNECTICUT

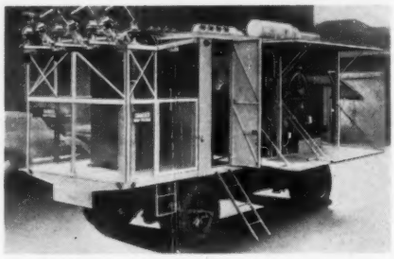
is automatically applied when not in operation. Unit is adaptable for use in narrow aisle, measuring only 37 inches in width. Three-wheel construction permits short turning radius of 7½ feet.

Shatter-proof Rheostat

International Resistance Co., 401 North Broad street, Philadelphia, is offering a new type all-metal rheostat for use where durability to withstand bomb concussions, as well as dependability to meet conditions of high humidity and other temperature extremes are prime essentials. Instead of ceramic insulators which might shatter, it has a bakelite insulator. It also has a 50 per cent lower temperature rise for equal size in other types and is available in both 25 and 50-watt sizes to meet the 200-hour salt-spray test requirement. A cover also is available to protect it from dust and dirt.

Generating Plants

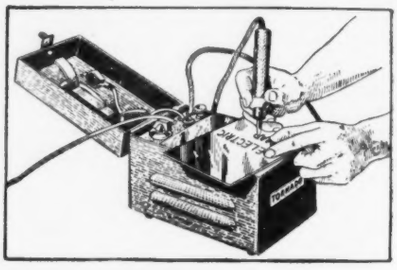
Ready-Power Co., 3818 Grand River avenue, Detroit, has introduced complete central station power houses on wheels—mobile generating plants for instant power generation whenever needed. Each unit includes two 50-kilowatt diesel engined electric plants, a switchboard, fuel oil storage tank, electric fuel transfer pump, lubricating oil



rectifier, starting batteries, station transformer and both alternating and direct-current station lighting system and, also, a sub-station with transformer, lighting arrestors and air break switches. It can be operated alone or in parallel with other mobile plants or as boosters in parallel with central station power. Its trailer design permits transportation at high speeds. The diesel engines are started on gasoline with automotive type starting motor, "thrown over" to full diesel operation after warming up. In case of battery failure, the engines can be cranked by hand.

Electric Etcher

Breuer Electric Mfg. Co., 5100 North Ravenwood avenue, Chicago, is offering Tornado electric etchers of special design for marking dies, tools and other portable equipment.



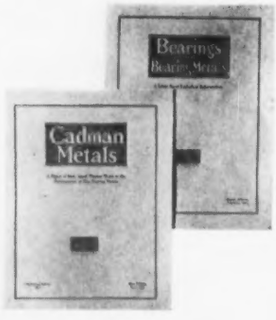
These are offered in several models for both light and heavy etching. Each etcher comes with tools, switch, indicator lamp, cords, etc., all embodied in a portable case.

Sandblast Hose

B. F. Goodrich Co., Akron, O., announces a new sandblast hose made of a new rubber compound, *sans* wire, which carries away static electricity as fast as it forms. Laboratory tests showed the new hose to have a resistance of only 3000 ohms per centimeter tube. For high voltages of static electricity the compound used in its construction is practically as good a conductor as metal, the company points out. The new hose is made in 4-ply construction with ¼-inch tube in sizes ranging from ¾ to 3 inches.

NO, THANKS, I WOULDN'T BE INTERESTED IN

CADMAN'S TWO FREE BOOKLETS ON BEARINGS & FINE BEARING METALS



We don't know how this gentleman came into the discussion; frankly, we don't believe he *would* care about studying the history, properties and function of bearing metals. But men who are closely associated with the industry, or who employ bearings and bearing metals would be more concerned. It is for these men, therefore, that we have prepared our two booklets, "Bearings and Bearing Metals", and "Cadman Metals". The information contained in these interesting booklets is there for all to read. Copies are free, and will be sent on request.

A. W. Cadman MFG. CO., PITTSBURGH, PA.

CHICAGO: Manhattan Bldg. PHILADELPHIA: 18 W. Chelten Av. NEW YORK: 270 Broadway

Ore Handling

(*Concluded from Page* 82)

considerable labor is involved in caring for either oil or coal-fired air heaters.

For a number of years the operators of the Ohio & Western Pennsylvania Dock Co. have employed electric strip heaters for heating the hoppers. Originally only the two sloping sides of the hopper were supplied with strip heaters, twenty-six 500-watt units per side. Since this original installation, 12 strips have been installed on each of the two vertical sides, making a total of seventy-six 500-watt strip heaters employed on the hopper—a connected load of 38 kilowatts. These hoppers are constructed so two opposite sides are vertical, the other two sides being at about a 50-degree angle. It is on these latter that the larger number of heaters are installed, since of course it is on the interior of these sides that there is the greatest tendency for the ore to stick.

As will be seen by referring to the accompanying diagram, the electric heater units are not fastened directly to the hopper plates but are pressed against them by means of compression springs, one spring being used at each end of a pair of 500-watt strip heaters. Even though there is considerable vibration and shock in the machine, this spring tension method of fastening has been found quite satisfactory as only a few units have a required replacement over several years' operation.

Note that the heat developed by the electric unit is transmitted directly to the sides of the hopper by conduction since the strip rests directly against the outer side of the plates. Also, an air space about 8 inches thick is provided by means of 8-inch channel which spaces the outer cover plates from the sides of the hopper. In addition, a ½-inch layer of Celotex is mounted on the inside of the cover plate to further insulate the assembly and to conserve the heat developed.

Roller Leveling

(*Continued from Page* 90)

accomplish this adjustment and are easily recognizable in Fig. 3.

Actually, the effect of these roll adjustments is much like that of shaping the rolls of a cold mill with a gas flame. An operator who is familiar with cold mill practice can usually operate this type of leveler with little or no training. All adjustments, excepting the individual hand lever controls, can be operated electrically or by hand, depending on the size of the machine. Fig. 3 shows a manually-operated leveler, whereas Fig. 1 illustrates a leveler equipped with electrical control. In either case, all controls are located centrally at the operator's pulpit.

Although the roll-supporting system as described is unique from an operating standpoint, it also has some unusual maintenance features. The backup rollers, for example, are twice the diameter of the leveling rolls and are mounted on double row antifriction bearings. Surface wear thus is reduced and the backup rollers cannot stick. Together, these two construction details eliminate the possibility of pitting or scoring the leveling rolls. Each backup roller is grease-sealed and cannot leak onto the material being leveled.

Introduced to the American rolling mill industries a decade ago, the Ungerer-type leveler is used widely on carbon and stainless steels, including high nickel alloy sheets, galvanized stock and tin plate, aluminum, and perforated metals of all kinds. Until recently, this leveler was built only by Edward W. Voss, who controls the patents on the unit

Front view of AMCO Rotary Hearth Furnace, including control panelboard, for heating all sizes of billets for shell forging.

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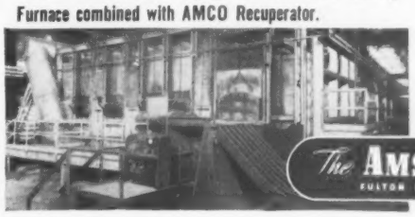
AMCO Heavy Duty Furnace for large forgings; fired with Pulverized Coal; automatically controlled.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in this country and Canada. Through a recent agreement between Voss and the United Engineering & Foundry Co., Pittsburgh, however, the latter company also is building this type leveler as part of its line of integrated rolling mill equipment.

Plate Preparation

(*Continued from Page 96*)

a better arrangement is now in use which still further mechanizes flame plate-edge preparation.

This machine, shown in Fig. 2, uses same type carriages and same arrangement of cutting nozzles as in single track and L-track installations, but requires crane service only for the delivery and removal of the plates. This machine also reduces total cutting time for any plate to approximately that required for making the longest cut. It also minimizes layout, measuring and manual handling labor. The unit consists of three separately controlled, closely coupled, roll-table conveyors over which the cutting machines travel on bridges that can be moved.

On the three roller-table sections, the plates are received, cut and discharged. The plates are moved from one section to the next on the live motor-driven rollers of the conveyor table, controlled through conveniently located modern push-buttons.

At the cutting section, mechanical means, controlled at a central point, are provided for aligning the plate and holding it in position during the cutting operation. At both sides of the cutting bed are accurately positioned rails on which operate the movable bridges carrying the cutting equipment. For the simultaneous cutting of four edges of a plate, three bridges are provided.

Longitudinal Cuts: The middle one of the three bridges is electrically driven by a variable-speed motor and gear reduction assembly and carries two cutting units which make longitudinal edge cuts simultaneously. They are easily adjustable to any position on the span across the roll table by means of a crank-operated feedscrew. Floating mountings for the cutting heads allow the torches to follow any waves in the plate.

The two end bridges carry the mechanisms for transverse cuts. These bridges are not motor-driven but have ball-bearing wheels for easy movement to any desired position along the main side rails. They can be locked quickly in place. On each of these bridges is a standard motor-driven carriage. Any of these units can be fitted with nozzle blocks carrying one, two or three nozzles for cutting a straight, square edge; a single bevel; a single bevel with unbeveled root face; a double bevel; or a double bevel with an unbeveled root face. Desired edge contour is produced in a single pass.

Since adjustment of all moving parts can be maintained accurately or quickly duplicated, a number of exactly similar plates can be cut very rapidly. Further, adjustments are so easily made that little time is required even if each plate is of different dimensions. Plates with curved edges and plates of irregular shape can also be cut by means of special attachments for the machine or by manual operation of the positioning controls.

Table I presents some production data based on the actual operation of this machine in a West Coast shipyard. Note that even for the most complicated double-vee and square-root-face preparation of 1-inch thick plate, the time required for complete preparation of all edges of a rectangular piece is only one minute per foot of longest plate dimension.

The development of an accurate and rapid method of plate-edge

preparation was fostered to a great extent by the development of rapid methods of welding and the consequent need for accuracy in plate alignment for butt-joint assemblies. It was not until the need for this alignment accuracy for automatic electric welding focused attention on edge preparation that the great advantages of accurate and uniform fitting of plate edges for manual arc welding were fully appreciated. Unfortunately, there are still many shipyard men who are unwilling to insist on careful edge preparation because they think costs will be increased. Actually *the net total cost is usually decreased because of the savings in welding expense made possible by the elimination of poorly fitted joints.*

Metal Heater Speeds Gun Part Production

Small parts used in the 50 caliber Browning machine gun are being hardened and annealed by its type C Berwick electric metal heater successfully and quickly according to a recent report from American Car & Foundry Co., New York.

Besides speeding up production, use of the heater is reported to provide more consistent results.

The speed-up in production is due to the elimination of the necessity for successive cleaning of parts to remove lead, etc.; the provision for a larger amount of additional heat treating capacity in a relatively small space and the fact that quick electric heat localizes the heat at the desired section.

Gages for Inspection; Why and How Used

Gages and Their Use in Inspection, by Fred H. Colvin; cloth, 157 pages, 4¾ x 7½ inches; published by McGraw-Hill Book Co., New York, for $1.50.

Importance of gages in modern manufacturing is generally recognized, as their use is necessary in producing accurate work, inspecting the result and assuring proper fit in the assembly. This volume is not a treatise on gage making but simply points out why gages are made, how they are constructed and used and makes clear many of the terms and questions that may cause confusion and misunderstanding. Thorough understanding of gages and their use make it easier for both workmen and inspectors, and may aid progress of a workman from the machine to the inspector's bench.

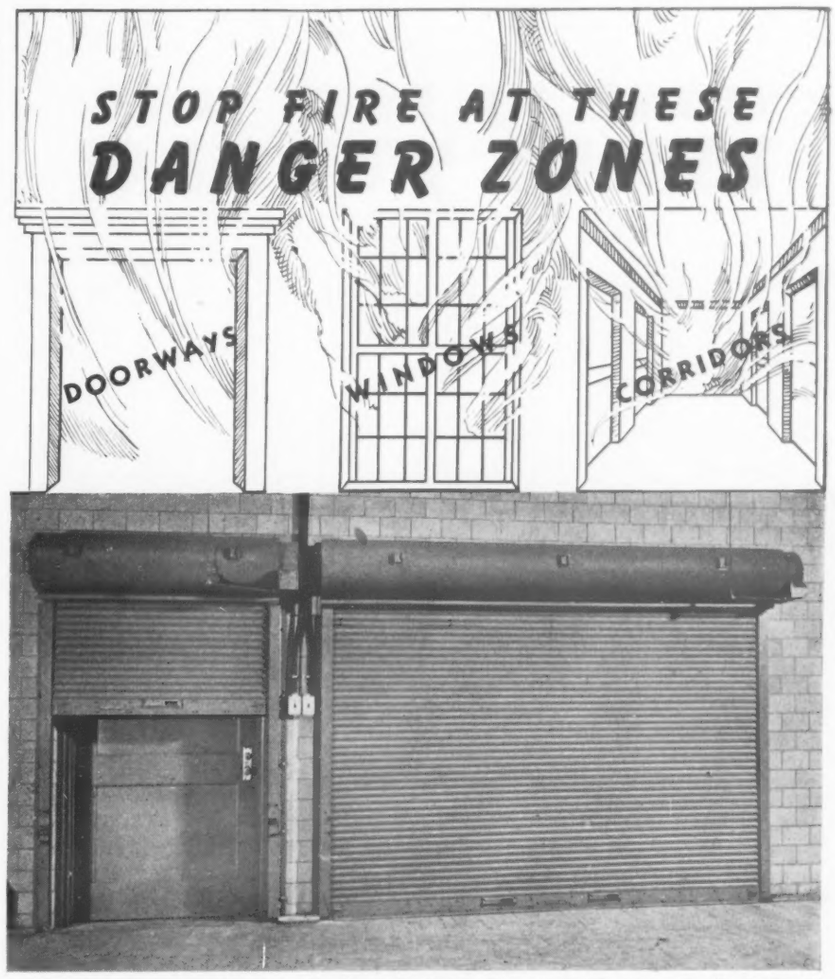
Gages are simple or complicated but their purpose and use is simple and easily understood if the principles involved are made clear. Proper use of gages enables the workman to turn out work as accurate as required by the machine in which it is to be used. The inspector should understand the principles guiding the use of gages to avoid rejection of perfect parts through misunderstanding.

Numerous illustrations portray various gages and their use. Diagrams and tabular matter illustrate accuracy required in engine lathes. A chapter is included on salvaging and selective assembly, by which parts not passing gage tests yet may be rendered usable at less cost than replacement.

Relates How Gages Save Time and Money

Eleven outstanding instances where savings in both time and money have resulted from the application of sensitive electric gaging equipment are related in a booklet entitled "Electric Gaging," recently issued by General Electric Co., Schenectady, N. Y.

Identified as GES-2543, the booklet also illustrates such electric gages as the strain gage, pressure gage, and film-thickness gage, suggesting applications for each.



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SAVING WAYS IN DOORWAYS — KINNEAR ROLLING DOORS

Develops Blackout Film for War Plants

An effective means of blacking out windows in war plants by the transfer method of applying surface coatings is reported by Di-Noc Mfg. Co., 1700 London road, Cleveland. The transfer consists of an elastic film that can be produced in a variety of colors and is applied to the exterior of windows. It eliminates window glare and prevents light from penetrating the glass.

According to the company, the film has sufficient elasticity to prevent shattering of glass in event of an explosion or bombing. In addition, it does not store up heat nor is it affected by temperature changes. To be manufactured in sheets, rolls or special sizes, it sticks to various types of surfaces when the material is moistened.

The company also has developed a luminous transfer to be used on objects in blacked-out rooms. It is said to emit a glow of greater intensity than luminous paint and can be used in making direction signs, marking stairs and doorways, identifying poles and electric light switches.

Containing a phosphorescent film that brightens a treated object in the dark, the luminous material maintains its brightness for about 15 hours, according to a company spokesman. It then can be recharged by playing on it any kind of light.

Another Di-Noc war development is a fluorescent transfer that brings out colors only when the treated material is subjected to an ultra-violet ray or "black" light.

New Gage Records Screw Sizes Quickly

A handy standard screw gage for calibrating both wood and machine screws in sizes from No. 1 to 12 is being offered by Dayton Rogers Mfg. Co., 2830 Thirteenth avenue, South Minneapolis, Minn. It features two sets of graduations—one that records instantly the number or size of the screws, and one that records the diameter size of various round stock from 1/16 to ¼-inch.

Made of flat steel 0.165-inch thick, the gage is carefully cut to size and is finished to prevent rusting. It is available free by requesting it on company letterhead.

Luminous Blackout Paint Glows 20 Hours

A luminous blackout paint called Durad, which can be applied to objects of all kinds, rendering them visible in the dark in announced by Maas & Waldstein Co., Newark, N. J. Like the radio-active finishes commonly used on watch dials, it owes its luminosity to a substance which re-radiates light, according to the company. Also it contains no toxic materials.

After the paint has been exposed to either daylight or ordinary electric illumination for a few minutes, it glows for about 20 hours and repeats the action after re-exposure. It must, however, be applied over a special primer and thinned out with a special thinner—both of which are supplied.

One thick coat, or, preferably, several thin coats of the paint produces a flat white finish suitable for indoor service. For a glossy finish or outdoor service, it is covered with a special topcoat.

Gives Tubing Tolerances

Babcock & Wilcox Tube Co., Beaver Falls, Pa., is offering a new convenient technical data card, providing in table form, tolerances for round, seamless-steel, mechanical tubing for both cold-drawn and hot-finished tubes. Identified as TDC115, the card may be had by making a request on company letterhead.

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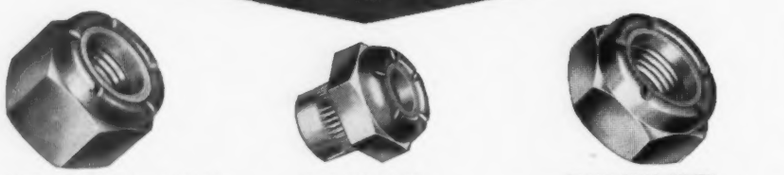

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ANACONDA
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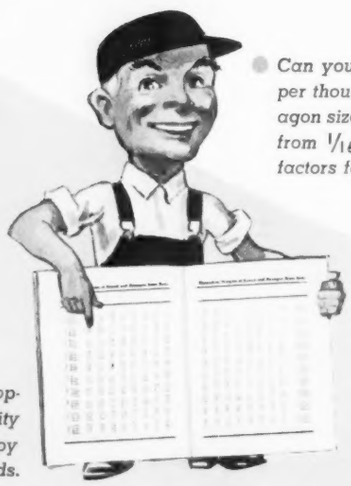

Can you use weight tables in pounds per thousand pieces, in round and hexagon sizes from 1/16" to 1 1/4", in lengths from 1/16" to 1", including conversion factors for various alloys and shapes?

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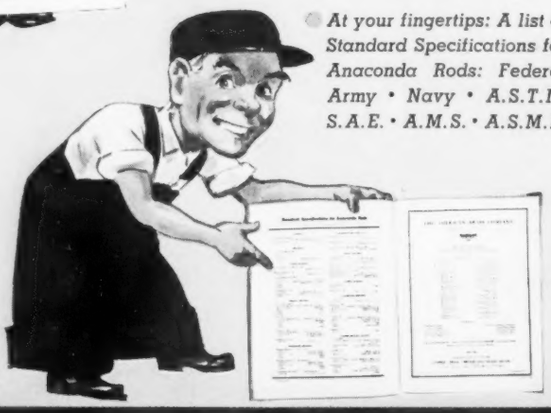

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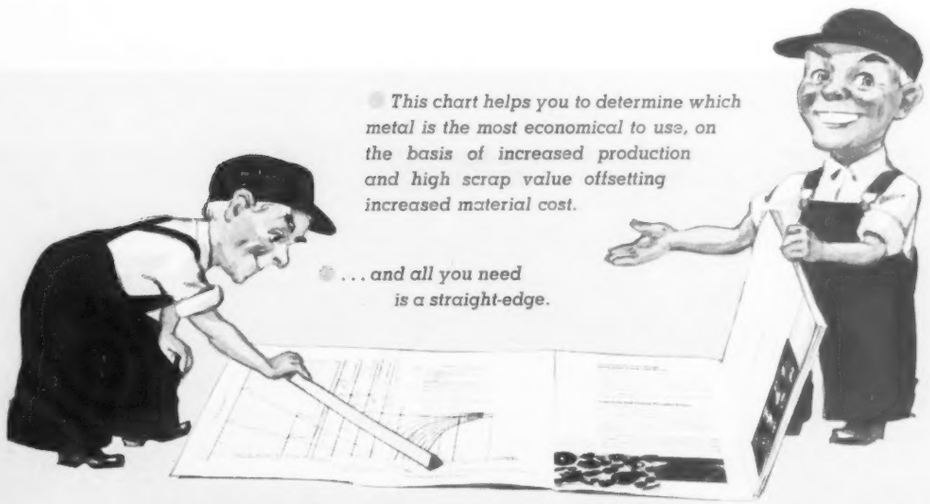
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LEADED BRASSES
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- Hardware Bronze—267
- Extruded Architectural Bronze—280
- Leaded Red Brass 80%—205
- Leaded Brass—211
- Butt Brass—229
- Free Cutting Yellow Brass—271
- Forging Brass—250

SPECIAL BRASSES
- Naval Brass—452
- *Tobin Bronze
- Manganese Bronze—937
- Leaded Naval Brass—612

PHOSPHOR BRONZES
- Phosphor Bronze 4%—903
- Phosphor Bronze 5%—351
- Leaded Phosphor Bronze 5%—979
- Phosphor Bronze 8%—353
- Phosphor Bronze 10%—354
- Special Free Cutting Phosphor Bronze—610
- Phosphor Bronze—314
- Phosphor Bronze—316

NICKEL SILVERS
- Extruded Leaded Nickel Silver 10%—823
- Leaded Nickel Silver 12%—796
- Leaded Nickel Silver 18%—789
- Nickel Silver 18%—719
- Nickel Silver 18%—723
- *Ambrac—850

CUPRO NICKELS
- Cupro Nickel 15%—736
- Super Nickel—701

ALUMINUM BRONZES
- Ambraloy—901
- Ambraloy—928
- *Avialite—915
- Ambraloy—917

COPPER-SILICON ALLOYS
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Substitutes Iron Powder

(*Concluded from Page* 100)

are carried on trays by a conveyor belt. Temperature is about 2050 degrees Fahr. Furnace atmosphere is controlled since any oxides allowed to form would prevent good bonding of the iron particles.

Teeth of gears so fashioned require no finish machining, the only operations necessary being chamfering and drilling, grinding gear ends and outside diameter, and burnishing the bore. The finish on the teeth, however, may be enhanced by subsequent lapping of the mating pair.

Press molding of the teeth of involute gears does away with any tooth modification rendered necessary by clearance requirements of the usual hob or gear cutter. Further, when machining gears of the type shown in Fig. 4 from the usual cylindrical blank, close to two-thirds of the metal will have to come off. Compared with this, gears fashioned from sintered powder afford a considerable saving of material as well as machining time.

Although a relatively late comer in the field, sintered powder pressing bids fair to spread widely through the pattern of the industrial arts.

Newly Formed Company To License Fastener

A newly organized company, Schaefer Permagrip Corp., 11 Public Square, Cleveland, reports it is now ready to license fabricators and manufacturers wishing to use the Permagrip concealed fastener system for attachment of armor plate without employing riveting or welding, and for providing for lamination of armor to absorb recoil.

According to the company, the system also may be utilized for mounting non-load-bearing sheets to frame structures. Other forms of Permagrip fasteners for various other applications also can be had.

Drop Forgings

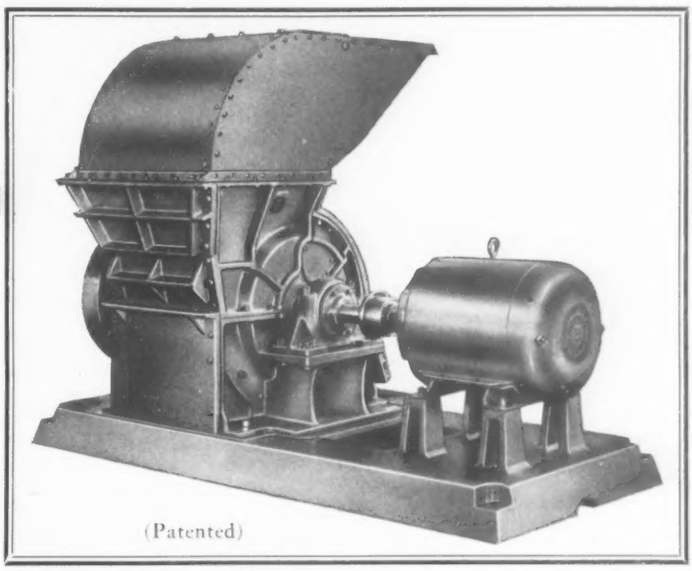
(*Concluded from Page* 69)

ture control should be maintained by thermocouples. The disappearing filament type of optical pyrometer is generally favored for control of forging temperatures. But misuse can lead to trouble so a reliable correction factor, based on experience in the shop, should be employed.

The rate of reheating and time of soaking at forging temperature are important. Proper soaking gives uniform metal flow in the forging operation while inadequate soaking gives rise to variation in grain flow and the possibility of defects such as forging bursts and the like. Factors which influence the soaking period are mass effect, type of material and the rate of reheating.

The ideal forging temperature thus depends on the material. In general it is desirable to work at temperatures such that forging is completed while the work is at a temperature not too high above the Ar_3 point. This then gives a refined grain structure and reduces the tendency to crack on cooling. In many cases the limited power available for working the metal necessitates the use of forging temperatures higher than the ideal as far as finishing temperature is concerned. There is often a tendency on the part of the operator to use high temperatures because of easier working and increased production. Care should be taken to avoid overheating since it is impossible to reclaim material which has been "burned".

There are many other aspects which should be given attention such as the effect of the various chemical compositions of aircraft steels and their susceptibilities to certain defects.Space does not permit an adequate discussion.



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Demand
Heavy, at high priority.

Prices
Some changes asked.

Production
Down 1 point to 95½.

THAT production and shipment of finished steel for war orders may be more closely related to sequence of preference ratings, regardless of the products involved, the War Production Board has ordered diversion of raw steel to essential needs to the fullest possible extent.

The process is to start with the ingot and follow through semifinished steel, at each step due regard being given to needs of finishing mills in meeting priority ratings on all products in the order of their importance. Thus steel will be supplied for A-1-a orders to the limit of mill production before lower preferences are served.

Many producers have been following a similar plan for some time and the application of the new order will not require much change in practice. Buyers of steel below top priority will be most affected. To meet the emergency the latter are making greater efforts to obtain high-priority war contracts.

In the experience of some steelmakers less tonnage was booked in the first two months this year than in the corresponding period last year. This is accounted for in part by the fact that a year ago many buyers for civilian production were seeking coverage, while now there is practically no pressure of that sort.

Steel ingot production last week receded 1 point to 95½ per cent, due in part to scrap restriction and in part to repair work by one producer, which caused idleness for the entire week. Detroit advanced 3 points to 87 per cent, St. Louis 5½ points to 83½ and Youngstown 3 points to 94. Chicago declined ½-point to 103 per cent, Pittsburgh ½-point to 95, eastern Pennsylvania 2 points to 88, Cleveland ½-point to 91, Wheeling 4 points to 81½ and Cincinnati 14½ points to 80 per cent. Unchanged rates were: Buffalo 79½, Birmingham 95 and New England 95.

Scrap supply shows no essential change, better volume being received in some districts while others find receipts curtailed. Intensive efforts to uncover dormant tonnage continue along various lines and produce some results but total achievement is not impressive. Material from automobile wrecking yards is being moved but time is required for its preparation in dealers' yards and it comes out slowly. Total available from this source is not as large as had been expected.

Request has been made by OPA to the Interstate Commerce Commission to delay application of the 6 per cent freight increase on several commodities, including scrap, until its effect on ceiling prices can be determined.

Higher prices may be allowed on ferromanganese after April 15, although current prices on other ferroalloys have been affirmed for second quarter. On advice from OPA that a decision on requests for higher ferromanganese prices will be made early next month present prices have been extended only to April 15.

Farm implement manufacturers may be curtailed and be unable to continue some lines, due to inability to obtain special shapes and large rounds, which enter largely into their products. Automobile accessory manufacturers, losing their principal outlet, are converting to armament orders, for which their equipment is suited in most cases. Conversion to war production is on the increase as subcontracting opportunities multiply in the effort to expedite production.

Steel ingot and castings production in February missed by ¼ of 1 per cent the all-time average weekly rate established in October, 1941. Average weekly output in February was 1,631,278 net tons, only 3639 tons less than the record of 1,634,917 tons per week in October. Total for the month was 6,525,111 tons, compared with 7,129,351 tons in January and 6,237,900 tons in February, last year. The steel industry operated at an average rate of 96 per cent of capacity in February.

Evidence of high speed at which the industry is working is apparent in the new record for February shipments of finished steel set by the United States Steel Corp., with 1,616,587 net tons. Shipments for two months this year totaled 3,355,480 tons, nearly 4 per cent more than 3,230,905 tons shipped in the same period last year.

Price composites, based on ceiling prices, have undergone no change and remain at the level of several months. Finished steel composite is $56.73, semifinished steel $36.00, steelmaking pig iron $23.05 and steelmaking scrap $19.17.

COMPOSITE MARKET AVERAGES

	Mar. 14	Mar. 7	Feb. 28	One Month Ago Feb., 1942	Three Months Ago Dec., 1941	One Year Ago Mar., 1941	Five Years Ago Mar., 1937
Finished Steel	$56.73	$56.73	$56.73	$56.73	$56.73	$56.73	$60.14
Semifinished Steel	36.00	36.00	36.00	36.00	36.00	36.00	39.24
Steelmaking Pig Iron	23.05	23.05	23.05	23.05	23.05	23.05	22.10
Steelmaking Scrap	19.17	19.17	19.17	19.17	19.17	20.15	21.25

Finished Steel Composite:—Average of industry-wide prices on sheets, strip, bars, plates, shapes, wire, nails, tin plate, standard and line pipe. Semifinished Steel Composite:—Average of industry-wide prices on billets, slabs, sheet bars, skelp and wire rods. Steelmaking Pig Iron Composite:—Average of basic pig iron prices at Bethlehem, Birmingham, Buffalo, Chicago, Cleveland, Neville Island, Granite City and Youngstown. Steelworks Scrap Composite:—Average of No. 1 heavy melting steel prices at Pittsburgh, Chicago and eastern Pennsylvania.

COMPARISON OF PRICES

Representative Market Figures for Current Week: Average for Last Month, Three Months and One Year Ago

Finished Material

	Mar. 14, 1942	Feb. 1942	Dec. 1941	Mar. 1941
Steel bars, Pittsburgh	2.15c	2.15c	2.15c	2.15c
Steel bars, Chicago	2.15	2.15	2.15	2.15
Steel bars, Philadelphia	2.47	2.47	2.47	2.47
Shapes, Pittsburgh	2.10	2.10	2.10	2.10
Shapes, Philadelphia	2.215	2.215	2.215	2.215
Shapes, Chicago	2.10	2.10	2.10	2.10
Plates, Pittsburgh	2.10	2.10	2.10	2.10
Plates, Philadelphia	2.15	2.15	2.15	2.225
Plates, Chicago	2.10	2.10	2.10	2.10
Sheets, hot-rolled, Pittsburgh	2.10	2.10	2.10	2.10
Sheets, cold-rolled, Pittsburgh	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Pittsburgh	3.50	3.50	3.50	3.50
Sheets, hot-rolled, Gary	2.10	2.10	2.10	2.10
Sheets, cold-rolled, Gary	3.05	3.05	3.05	3.05
Sheets, No. 24 galv., Gary	3.50	3.50	3.50	3.50
Bright bess., basic wire, Pitts.	2.60	2.60	2.60	2.60
Tin plate, per base box, Pitts.	$5.00	$5.00	$5.00	$5.00
Wire nails, Pittsburgh	2.55	2.55	2.55	2.55

Semifinished Material

Sheet bars, Pittsburgh, Chicago	$34.00	$34.00	$34.00	$34.00
Slabs, Pittsburgh, Chicago	34.00	34.00	34.00	34.00
Rerolling billets, Pittsburgh	34.00	34.00	34.00	34.00
Wire rods No. 5 to ⅜-inch, Pitts.	2.00	2.00	2.00	2.00

Pig Iron

	Mar. 14, 1942	Feb. 1942	Dec. 1941	Mar. 1941
Bessemer, del. Pittsburgh	$25.34	$25.34	$25.34	$25.34
Basic, Valley	23.50	23.50	23.50	23.50
Basic, eastern, del. Philadelphia	25.34	25.34	25.34	25.34
No. 2 fdry., del. Pgh., N.&S. Sides	24.69	24.69	24.69	24.69
No. 2 foundry, Chicago	24.00	24.00	24.00	24.00
Southern No. 2, Birmingham	20.38	20.38	20.38	20.38
Southern No. 2, del. Cincinnati	24.06	24.06	24.06	24.06
No. 2X, del. Phila. (differ. av.)	26.215	26.215	26.215	26.215
Malleable, Valley	24.00	24.00	24.00	24.00
Malleable, Chicago	24.00	24.00	24.00	24.00
Lake Sup., charcoal, del. Chicago	31.34	31.34	31.34	30.34
Gray forge, del. Pittsburgh	24.19	24.19	24.19	24.18
Ferromanganese, del. Pittsburgh	125.53	125.33	125.33	125.33

Scrap

Heavy melting steel, Pitts.	$20.00	$20.00	$20.00	$20.75
Heavy melt. steel, No. 2, E. Pa.	18.75	18.75	18.00	18.65
Heavy melting steel, Chicago	18.75	18.75	18.75	19.45
Rails for rolling, Chicago	22.25	22.25	22.25	24.00
No. 1 cast, Chicago	20.00	20.00	21.20	20.25

Coke

Connellsville, furnace, ovens	$6.25	$6.25	$6.25	$5.50
Connellsville, foundry, ovens	7.25	7.25	7.25	6.00
Chicago, by-product fdry., del.	12.25	12.25	12.25	11.75

STEEL, IRON, RAW MATERIAL, FUEL AND METALS PRICES

Following are maximum prices established by OPA Schedule No. 6 issued April 16, 1941, revised June 20, 1941 and Feb. 4, 1942. The schedule covers all iron or steel ingots, all semifinished iron or steel products, all finished hot-rolled, cold-rolled iron or steel products and any iron or steel product which is further finished by galvanizing, plating, coating, drawing, extruding, etc., although only principal established basing points for selected products are named specifically. All seconds and off-grade products also are covered. Exceptions applying to individual companies are noted in the table.

Semifinished Steel

Gross ton basis except wire rods, skelp

Carbon Steel Ingots: F.o.b. mill base, rerolling qual., stand. analysis, $31.00
(Empire Sheet & Tin Plate Co., Mansfield, O., may quote carbon steel ingots at $33 gross ton, f.o.b. mill.)

Alloy Steel Ingots: Pittsburgh base, uncropped, $45.00.

Rerolling Billets, Slabs: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Sparrows Point, Birmingham, Youngstown, $34.00; Detroit, del. $36.00; Duluth (bil.) $36.00.
(Wheeling Steel Corp. allocated 21,000 tons 2" square, base grade rerolling billets under lease-lend during first quarter 1942 at $37, f.o.b. Portsmouth, O.; Andrews Steel Co. may quote carbon steel slabs $41 gross ton at established basing points.)

Forging Quality Billets: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, Youngstown, $40.00; Detroit, del. $42.00; Duluth, $42.00.
(Andrews Steel Co. may quote carbon forging billets $50 gross ton at established basing points.)

Open Hearth Shell Steel: Pittsburgh, Chicago, base 1000 tons one size and section: 3-12 in., $52.00; 12-18 in., $54.00; 18 in. and over, $56.00.

Alloy Billets, Slabs, Blooms: Pittsburgh, Chicago, Buffalo, Bethlehem, Canton, Massillon, $54.00.

Sheet Bars: Pittsburgh, Chicago, Cleveland, Buffalo, Canton, Sparrows Point, Youngstown, $34.00.
(Empire Sheet & Tin Plate Co., Mansfield, O., may quote carbon steel sheet bars at $39 gross ton, f.o.b. mill.)

Skelp: Pittsburgh, Chicago, Sparrows Pt., Youngstown, Coatesville, lb., $1.90.

Wire Rods: Pittsburgh, Chicago, Cleveland, Birmingham, No. 5—9/32 in., inclusive, per 100 lbs., $2.00.
Do., over 9/32—47/64-in., incl., $2.15. Worcester add $0.10 Galveston, $0.25. Pacific Coast $0.50 on water shipment.

Bars

Hot-Rolled Carbon Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, Birmingham, base 20 tons one size, 2.15c; Duluth, base 2.25c; Detroit, del. 2.25c; New York del. 2.49c; Phila. del. 2.47c; Gulf Ports, dock 2.50c, all-rail 2.59c; Pac. ports, dock 2.80c; all-rail 3.25c.
(Phoenix Iron Co., Phoenixville, Pa., may quote 2.35c at established basing points.)

Rail Steel Bars: Same prices as for hot-rolled carbon bars except base is 5 tons.
(Sweet's Steel Co., Williamsport, Pa., may quote rail steel merchant bars 2.33c f.o.b. mill; W. Ames & Co., Jersey City, N. J., may quote 2.85c, f.o.b. mill for 10 tons or over.)

Hot-Rolled Alloy Bars: Pittsburgh, Chicago, Canton, Massillon, Buffalo, Bethlehem, base 20 tons one size, 2.70c Detroit 2.80c.

S.A.E.	Alloy Diff.	S.A.E.	Alloy Diff.
2000	0.35	5100 Spr. flats	0.15
2100	0.75	5100 80-1.10 Cr.	0.45
2300	1.70	6100 Bars	1.20
2500	2.55	6100 Spr. flats	0.85
3100	0.70	Carb., Van.	0.85
3200	1.35	9200 Spr. flats	0.15
3200	1.35	9200 Spr. rounds, squares	0.40
3300	3.80	T 1300, Mn. mean	
3400	3.20	1.51-2.00	0.10
4100 .15-25 Mo.	0.55	Do., carbon under	
6.00 .20-.30 Mo. 1.50-2.00; Ni.	1.20	0.20 max.	0.35

Cold-Finished Carbon Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 20,000-39,999 lbs., 2.65c; Detroit 2.70.

Cold-Finished Alloy Bars: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base 3.35c; Detroit 3.45c; Galveston, add $0.25, Pacific Coast $0.50.

Turned, Ground Shafting: Pittsburgh, Chicago, Gary, Cleveland, Buffalo, base (not including turning, grinding, polishing extras) 2.65c; Detroit 2.70c.

Reinforcing Bars (New Billet): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Sparrows Point, Buffalo, Youngstown, base 2.15c; Detroit del. 2.25c; Gulf ports, dock 2.50c, all-rail 2.59c; Pacific ports, dock 2.80c, all-rail 3.25c.

Reinforcing Bars (Rail Steel): Pittsburgh, Chicago, Gary, Cleveland, Birmingham, base 2.15c; Detroit, del 2.25c; Gulf ports, dock 2.50c, all-rail 2.59c; Pacific ports, dock 2.80c, all-rail 3.25c.
(Sweet's Steel Co., Williamsport, Pa., may quote rail steel reinforcing bars 2.33c, f.o.b. mill; W. Ames & Co., Jersey City, N. J., may quote 2.85c, f.o.b. mill, for 10 tons or over.)

Iron Bars: Single refined, Pitts. 4.40c, double refined 5.40c; Pittsburgh, staybolt, 5.75c; Terre Haute, common, 2.15c; Phila. del., common, 3.06c-3.50c.

Sheets, Strip

Hot-Rolled Sheets: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Buffalo, Youngstown, Sparrows Pt., Middletown, base 2.10c; Granite City, base 2.20c; Detroit del. 2.20c; Phila. del. 2.27c; New York del., 2.34c; Pacific ports 2.65c.
(Andrews Steel Co. may quote hot-rolled sheets for shipment to Detroit and the Detroit area on the Middletown, O. base.)

Cold-Rolled Sheets: Pittsburgh, Chicago, Cleveland, Gary, Buffalo, Youngstown, Middletown, base, 3.05c; Granite City, base 3.15c; Detroit del. 3.15c; New York del. 2.39c; Phila. del. 3.37c; Pacific ports, 3.70c.

Galvanized Sheets, No. 24: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Youngstown, Sparrows Point, Middletown, base 3.50c; Granite City, base 3.60c; New York del. 3.74c; Phila. del. 3.67c; Pacific ports 4.05c.
(Andrews Steel Co. may quote galvanized sheets 3.75c at established basing points.)

Corrugated Galv. Sheets: Pittsburgh, Chicago, Gary, Birmingham, 29 gage, per square 3.31c.

Culvert Sheets: Pittsburgh, Chicago, Gary, Birmingham, 16 gage, not corrugated, copper alloy 3.60c; copper iron 3.90c, pure iron 3.95c;

zinc-coated, hot-dipped, heat-treated, No. 24, Pittsburgh 4.25c.

Enameling Sheets: Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, 10 gage, base 2.75c; Granite City, base 2.85c; Pacific ports 3.40c.

Pittsburgh, Chicago, Gary, Cleveland, Youngstown, Middletown, 20 gage, base 3.35c; Granite City, base 3.45c; Pacific ports 4.00c.

Electrical Sheets, No. 24:

	Pittsburgh Base	Pacific Ports	Granite City
Field grade	3.20c	3.95c	3.30c
Armature	3.55c	4.30c	3.65c
Electrical	4.05c	4.80c	4.15c
Motor	4.95c	5.70c	5.05c
Dynamo	5.65c	6.40c	5.75c
Transformer			
72	6.15c	6.90c	.....
65	7.15c	7.90c	.....
58	7.65c	8.40c	.....
52	8.45c	9.20c	.....

Hot-Rolled Strip: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Middletown, base, 1 ton and over, 12 inches wide and less 2.10c; Detroit del. 2.20c; Pacific ports 2.75c.

Cold Rolled Strip: Pittsburgh, Cleveland, Youngstown, 0.25 carbon and less 2.80c; Chicago, base 2.90c; Detroit, del. 2.90c; Worcester base 3.00c.

Commodity C. R. Strip: Pittsburgh, Cleveland, Youngstown, base 3 tons and over, 2.95c; Worcester base 3.35c.

Cold-Finished Spring Steel: Pittsburgh, Cleveland bases, add 20c for Worcester; .26-.50 Carb., 2.80c; .51-.75 Carb., 4.30c; .76-1.00 Carb., 6.15c; over 1.00 Carb., 8.35c.

Tin, Terne Plate

Tin Plate: Pittsburgh, Chicago, Gary, 100-lb. base box, $5.00; Granite City $5.10.

Tin Mill Black Plate: Pittsburgh, Chicago, Gary, base 29 gage and lighter, 3.05c; Granite City, 3.15c; Pacific ports, boxed 4.05c.

Long Ternes: Pittsburgh, Chicago, Gary, No. 24 unassorted 3.80c.

Manufacturing Ternes: Pittsburgh, Chicago, Gary, 100-base box $4.30; Granite City $4.40.

Roofing Ternes: Pittsburgh base per package 112 sheets, 20 x 28 in., coating I.C., 8-lb. $12.00; 15-lb. $14.00; 20-lb. $15.00; 25-lb. $16.00; 30-lb. $17.25; 40-lb. $19.50.

Plates

Carbon Steel Plates: Pittsburgh, Chicago, Gary, Cleveland, Birmingham, Youngstown, Sparrows Point, Coatesville, Claymont, 2.10c; New York, del., 2.29-54c; Phila., del., 2.15c; St. Louis, 2.34c; Boston, del., 2.42-67c; Pacific ports, 2.65c; Gulf Ports, 2.45c.

(Central Iron & Steel Co. may quote carbon steel plates at 2.35c at established basing points; Granite City Steel Co. may quote ship plates 2.25c, f.o.b. mill.)

Floor Plates: Pittsburgh, Chicago, 3.35c; Gulf ports, 3.70c; Pacific ports, 4.00c.

Open-Hearth Alloy Plates: Pittsburgh, Chicago, Coatesville, 3.50c.

Wrought Iron Plates: Pittsburgh, 3.80c.

Shapes

Structural Shapes: Pittsburgh, Chicago, Gary, Birmingham, Buffalo, Bethlehem, 2.10c; New York, del., 2.27c; Phila., del., 2.21½c; Gulf ports, 2.45c; Pacific ports, 2.75c.

(Phoenix Iron Co., Phoenixville, Pa. may quote carbon steel shapes at 2.30c at established basing points.)

Steel Sheet Piling: Pittsburgh, Chicago, Buffalo, 2.40c.

Wire Products, Nails

Wire: Pittsburgh, Chicago, Cleveland, Birmingham (except spring wire) to manufacturers in carloads (add $2 for Worcester):

Bright basic bessemer wire	2.60c
Galvanized wire	2.60c
Spring wire	3.20c

Wire Products to the Trade:

Standard and cement-coated wire nails, polished and staples, 100-lb. keg	$2.55
Annealed fence wire, 100 lb.	3.05
Galvanized fence wire, 100 lb.	3.40
Woven fence, 12½ gage and lighter, per base column	67
Do., 11 gage and heavier	70
Barbed wire, 80-rod spool, col.	70
Twisted barbless wire, col.	70
Single loop bale ties, col.	59
Fence posts, carloads, col.	69
Cut nails, Pittsburgh, carloads	$3.85

Pipe, Tubes

Welded Pipe: Base price in carloads to consumers about $200 per net ton. Base discounts on steel pipe Pittsburgh and Lorain, O.; Gary, Ind. 2 points less on lap weld, 1 point less on butt weld. Pittsburgh base only on wrought iron pipe.

Butt Weld

Steel In.	Blk.	Galv.	Iron In.	Blk.	Galv.
⅛	56	33	½	24	31½
¼ & ⅜	59	40½	¾	30	10
½	63½	51	1-1¼	34	16
¾	66½	55	1½	38	18½
1-3	68½	57½	2	37½	18

Lap Weld

Steel In.	Blk.	Galv.	Iron In.	Blk.	Galv.
2	61	49½	1¼	23	3½
2½-3	64	52½	1½	28½	10
3½-6	66	54½	2	30½	12
7-8	65	52½	2½, 3½	31½	14½
9-10	64½	52	4	33½	18
11-12	63½	51	4½-8	32½	17
			9-12	28½	12

Boiler Tubes: Net base prices per 100 feet, f.o.b. Pittsburgh in carload lots, minimum wall, cut lengths 4 to 24 feet, inclusive.

O. D. Sizes	B.W.G.	—Seamless— Hot Rolled	Cold Drawn	—Lap Weld— Steel	Charcoal Iron
1"	13	$ 7.82	$ 9.01	.....	.....
1¼"	13	9.26	10.67	.....	.....
1½"	13	10.23	11.72	$ 9.72	$23.71
1¾"	13	11.64	13.42	11.06	22.93
2"	13	13.04	15.03	12.38	19.35
2¼"	13	14.54	16.76	13.79	21.63
2¼"	12	16.01	18.45	15.16	.....
2½"	12	17.54	20.21	16.58	26.57
2¾"	12	18.59	21.42	17.54	29.00
3"	12	19.50	22.48	18.35	31.38
3½"	11	24.63	28.37	23.15	39.81
4"	10	30.54	35.20	28.66	49.90
4½"	10	37.35	43.04	35.22	.....
5"	9	46.87	54.01	44.25	73.93
6"	7	71.96	82.93	68.14	.....

Rails, Supplies

Standard rails, over 60-lb., f.o.b. mill, gross ton, $40.00.

Light rails (billet), Pittsburgh, Chicago, Birmingham, gross ton, $40.00.

*Relaying rails, 35 lbs. and over, f.o.b. railroad and basing points, $28-$30.

Supplies: Angle bars, 2.70c; tie plates, 2.15c; track spikes, 3.00c; track bolts, 4.75c; do. heat treated, 5.00c.

*Fixed by OPA Schedule No. 46, Dec. 15, 1941.

Tool Steels

Tool Steels: Pittsburgh, Bethlehem, Syracuse, base, cents per lb.: Reg. carbon 14.00c; extra carbon 18.00c; special carbon 22.00c; oil-hardening 24.00c; high car.-chr. 43.00c.

High Speed Tool Steels:

Tung.	Chr.	Van.	Moly.	Pitts. base, per lb.
18.00	4	1	..	67.00c
18.00	4	2	1	77.00c
18.00	4	3	1	87.00c
1.5	4	1	8.5	54.00c
.....	4	2	8	54.00c
5.50	4	1.50	4	57.50c
5.50	4.50	4	4.50	70.00c

Stainless Steels

Base, Cents per lb.—f.o.b. Pittsburgh

CHROMIUM NICKEL STEEL

Type	Bars	Plates	Sheets	H. R. Strip	C. R. Strip
302	24.00c	27.00c	34.00c	21.50c	28.00c
303	26.00	29.00	36.00	27.00	33.00
304	25.00	29.00	36.00	23.50	30.00
308	29.00	34.00	41.00	28.50	35.00
309	36.00	40.00	47.00	37.00	47.00
310	49.00	52.00	53.00	48.75	56.00
311	49.00	52.00	53.00	48.75	56.00
312	36.00	40.00	49.00	.....	.....
*316	40.00	44.00	48.00	40.00	48.00
*317	50.00	54.00	58.00	50.00	58.00
†321	29.00	34.00	41.00	29.25	38.00
‡347	33.00	38.00	45.00	33.00	42.00
431	19.00	22.00	29.00	17.50	22.50

STRAIGHT CHROMIUM STEEL

403	21.50	24.50	29.50	21.25	27.00
**410	18.50	21.50	26.50	17.00	22.00
416	19.00	22.00	27.00	18.25	23.50
††420	24.00	28.50	33.50	23.75	36.50
430	19.00	22.00	29.00	17.50	22.50
‡‡430F	19.50	22.50	29.50	18.75	24.50
442	22.50	25.50	32.50	24.00	32.00
446	27.50	30.50	36.50	35.00	52.00
501	8.00	12.00	15.75	12.00	17.00
502	9.00	13.00	16.75	13.00	18.00

STAINLESS CLAD STEEL (20%)

304	.....	§§18.00	19.00	.....	.....

*With 2-3% moly. †With titanium. ‡With columbium. **Plus machining agent. ††High carbon. ‡‡Free machining. §§Includes annealing and pickling.

Basing Point Prices are (1) those announced by U. S. Steel Corp. subsidiaries for first quarter of 1941 or in effect April 16, 1941 at designated basing points or (2) those prices announced or customarily quoted by other producers at the same designated points. Base prices under (2) cannot exceed those under (1) except to the extent prevailing in third quarter of 1940.

Extras mean additions or deductions from base prices in effect April 16, 1941.

Delivered prices applying to Detroit, Eastern Michigan, Gulf and Pacific Coast points are deemed basing points except in the case of the latter two areas when water transportation is not available, in which case nearest basing point price plus all-rail freight may be charged.

Domestic Ceiling prices are the aggregate of (1) governing basing point price, (2) extras and (3) transportation charges to the point of delivery as customarily computed. **Governing basing point** is basing point nearest the consumer providing the lowest delivered price. **Emergency basing point** is the basing point at or near the place of production or origin of shipment.

Dislocated tonnage: Producers shipping material outside their usual marketing areas because of the war emergency may charge the basing point price nearest place of production plus actual cost of transportation to destination.

Seconds or off-grade iron or steel products cannot be sold at delivered prices exceeding those applying to material of prime quality.

Export ceiling prices may be either the aggregate of (1) governing basing point or emergency basing point (2) export extras (3) export transportation charges provided they are the f.a.s. seaboard quotations of the U. S. Steel Export Co. on April 16, 1941. Domestic or export extras may be used in case of Lease-Lend tonnage.

Bolts, Nuts

F.o.b. Pittsburgh, Cleveland, Birmingham, Chicago. Discounts for carloads additional 5%, full containers, add 10%.

Carriage and Machine

½ x 6 and smaller	65½ off
Do., ⅝ and ⅞ x 6-in. and shorter	63½ off
Do., ¾ to 1 x 6-in. and shorter	61 off
1⅛ and larger, all lengths	59 off
All diameters, over 6-in. long	59 off
Tire bolts	50 off

Stove Bolts

In packages with nuts separate 71-10 off; with nuts attached 71 off; bulk 30 off on 15,000 of 3-inch and shorter, or 5000 over 3-in.

Step bolts	56 off
Plow bolts	65 off

Nuts

Semifinished hex.	U.S.S.	S.A.E.
½-inch and less	62	64
⅝-1-inch	59	60
1⅛-1½-inch	57	58
1⅝ and larger	56	..

Hexagon Cap Screws

Upset 1-in., smaller	60 off

Square Head Set Screws

Upset, 1-in., smaller	68 off
Headless, ¼-in., larger	55 off
No. 10, smaller	60 off

Piling

Pittsburgh, Chicago, Buffalo	2.40c

Rivets, Washers

F.o.b. Pittsburgh, Cleveland, Chicago, Birmingham

Structural	3.75c
⅞-inch and under	65-5 off
Wrought washers, Pittsburgh, Chicago Philadelphia, to jobbers and large nut, bolt manufacturers l.c.l.	$2.75-3.00 off

Metallurgical Coke

Price Per Net Ton

Beehive Ovens

Connellsville, furnace	$6.00
Connellsville, foundry	7.00- 7.50
Connellsville prem. fdry.	7.25- 7.60
New River, foundry	8.00- 8.25
Wise county, foundry	7.50
Wise county, furnace	6.50

By-Product Foundry

Kearny, N. J., ovens	12.15
Chicago, outside delivered	11.50
Chicago, delivered	12.25
Terre Haute, delivered	12.00
Milwaukee, ovens	12.25
New England, delivered	13.75
St. Louis, delivered	12.25
Birmingham, ovens	8.50
Indianapolis, delivered	12.00
Cincinnati, delivered	11.75
Cleveland, delivered	12.30
Buffalo, delivered	12.50
Detroit, delivered	12.25
Philadelphia, delivered	12.38

Coke By-Products

Spot, gal., freight allowed east of Omaha

Pure and 90% benzol	15.00c
Toluol, two degree	28.00c
Solvent naphtha	27.00c
Industrial xylol	27.00c
Per lb. f.o.b. works	
Phenol (car lots, returnable drums)	12.50c
Do. less than car lots	13.25c
Do. tank cars	11.50c
Eastern Plants, per lb.	
Naphthalene flakes, balls, bbls. to jobbers	8.00c
Per ton, bulk, f.o.b. port	
Sulphate of ammonia	$29.00

Pig Iron

Prices (in gross tons) are maximums fixed by OPA Price Schedule No. 10, effective June 10, 1941. Exceptions indicated in footnotes. Allocation regulations from WPB Order M-17, expiring Dec. 31, 1942. Base prices bold face, delivered light face.

	No. 2 Foundry	Basic	Bessemer	Malleable
Bethlehem, Pa., base	$25.00	$24.50	$26.00	$25.50
Newark, N. J., del.	26.53	26.03	27.53	27.03
Brooklyn, N. Y., del.	27.50	.....	.....	28.00
Birdsboro, Pa., del.	25.00	24.50	26.00	25.50
Philadelphia, del.	.....	.....	.....	.....
Birmingham, base	†20.38	†19.00	.....	.....
Baltimore, del.	25.61	24.73	.....	.....
Boston, del.	25.12	.....	.....	.....
Chicago, del.	†24.22	.....	.....	.....
Cincinnati, del.	24.06	22.60	.....	.....
Cleveland, del.	24.12	23.24	.....	.....
Newark, N. J., del.	26.15	.....	.....	.....
Philadelphia, del.	25.46	24.58	.....	.....
St. Louis, del.	†24.12	23.24	.....	.....
Buffalo, base	24.00	23.00	25.00	24.50
Boston, del.	25.50	25.00	26.50	26.00
Rochester, del.	25.53	.....	26.53	26.03
Syracuse, del.	26.08	.....	27.08	26.58
Chicago, base	24.00	23.50	24.50	24.00
Milwaukee, del.	25.10	24.60	25.60	25.10
Muskegon, Mich., del.	27.19	26.69	27.69	27.19
Cleveland, base	24.00	23.50	24.50	24.00
Akron, Canton, O., del.	25.39	24.89	25.89	25.39
Detroit, base	24.00	23.50	24.50	24.00
Saginaw, Mich., del.	26.31	25.81	26.81	26.31
Duluth, base	24.50	.....	25.00	24.50
St. Paul, del.	26.63	.....	27.13	26.63
Erie, Pa., base	24.00	23.50	25.00	24.50
Everett, Mass., base	25.00	24.50	26.00	25.50
Boston	25.50	25.00	26.50	26.00
Granite City, Ill., base	24.00	23.50	24.50	24.00
St. Louis, del.	24.50	24.00	.....	24.50
Hamilton, O., base	24.00	23.50	.....	24.00
Cincinnati, del.	24.44	24.61	.....	25.11
Neville Island, Pa., base	24.00	23.50	24.50	24.00
§Pittsburgh, del., No. & So. sides	24.69	24.19	25.19	24.69
Provo, Utah, base	22.00	.....	.....	.....
Sharpsville, Pa., base	24.00	23.50	24.50	24.00
Sparrows Point, Md., base	25.00	24.50	.....	.....
Baltimore, del.	25.99	.....	.....	.....
Steelton, Pa., base	.....	24.50	.....	25.50
Swedeland, Pa., base	25.00	24.50	26.00	25.50
Philadelphia, del.	25.84	25.34	.....	26.34
Toledo, O., base	24.00	23.50	24.50	24.00
Mansfield, O., del.	25.94	25.44	25.44	25.94
Youngstown, O., base	24.00	23.50	24.50	24.00

*Basic silicon grade (1.75-2.25%), add 50c for each 0.25%. †For phosphorous 0.70 and over deduct 38c. ‡Over 0.70 phos. §For McKees Rocks, Pa., add .55 to Neville Island base; Lawrenceville, Homestead, McKeesport, Ambridge, Monaca, Aliquippa, .84; Monessen, Monongahela City .97 (water); Oakmont, Verona 1.11; Brackenridge 1.24.

High Silicon, Silvery

6.00-6.50 per cent (base)	$29.50		
6.51-7.00	$30.50	9.01- 9.50	$35.50
7.01-7.50	31.50	9.51-10.00	36.50
7.51-8.00	32.50	10.01-10.50	37.50
8.01-8.50	33.50	10.51-11.00	38.50
8.51-9.00	34.50	11.01-11.50	39.50

F.o.b. Jackson county, O., per gross ton, Buffalo base prices are $1.25 higher. Prices subject to additional charge of 50 cents a ton for each 0.50% manganese in excess of 1.00%.

Bessemer Ferrosilicon

Prices same as for high silicon silvery iron, plus $1 per gross ton. (For higher silicon irons a differential over and above the price of base grades is charged as well as for the hard chilling irons, Nos. 5 and 6.)

Charcoal Pig Iron

Northern

Lake Superior Furn.	$28.00
Chicago, del.	31.34

Southern

Semi-cold blast, high phos., f.o.b. furnace, Lyles, Tenn.	$28.50
Semi-cold blast, low phos., f.o.b furnace, Lyles, Tenn.	33.00

Gray Forge

Neville Island, Pa.	$23.50
Valley, base	23.50

Low Phosphorus

Basing points: Birdsboro and Steelton, Pa., and Buffalo, N. Y., $29.50 base; $30.74, delivered, Philadelphia.

Switching Charges: Basing point prices are subject to an additional charge for delivery within the switching limits of the respective districts.

Silicon Differentials: Basing point prices are subject to an additional charge not to exceed 50 cents a ton for each 0.25 silicon in excess of base grade (1.75 to 2.25%).

Phosphorous Differential: Basing point prices are subject to a reduction of 38 cents a ton for phosphorous content of 0.70% and over.

Manganese Differentials: Basing point prices subject to an additional charge not to exceed 50 cents a ton for each 0.50% manganese content in excess of 1.0%.

Ceiling prices are the aggregate of (1) governing basing point (2) differentials (3) transportation charges from governing basing point to point of delivery as customarily computed. Governing basing point is the one resulting in the lowest delivered price for the consumer.

Exceptions to Ceiling Prices: Pittsburgh Coke & Iron Co. (Sharpsville, Pa. furnace only) and Struthers Iron & Steel Co. may charge 50 cents a ton in excess of basing point prices for No. 2 Foundry, Basic, Bessemer and Malleable. E. & G. Brooke Iron Co. may charge $1 a ton in excess of basing point prices.

Export Prices: In case of exports only, the governing basing point nearest point of production may be used, plus differentials and export transportation charges.

Refractories

Per 1000 f.o.b. Works, Net Prices

Fire Clay Brick	
Super Quality	
Pa., Mo., Ky.	$64.60
First Quality	
Pa., Ill., Md., Mo., Ky.	51.30
Alabama, Georgia	51.30
New Jersey	56.00
Second Quality	
Pa., Ill., Ky., Md., Mo.	46.55
Georgia, Alabama	38.00
New Jersey	49.00
Ohio	
First quality	43.00
Intermediate	36.10
Second quality	36.00
Malleable Bung Brick	
All bases	$59.85
Silica Brick	
Pennsylvania	$51.30
Joliet, E. Chicago	58.90
Birmingham, Ala.	51.30
Ladle Brick (Pa., O., W. Va., Mo.)	
Dry press	$31.00
Wire cut	29.00
Magnesite	
Domestic dead-burned grains, net ton f.o.b. Chewelah, Wash., net ton, bulk	22.00
net ton, bags	26.00
Basic Brick	
Net ton, f.o.b. Baltimore, Plymouth Meeting, Chester, Pa.	
Chrome brick	$54.00
Chem. bonded chrome	54.00
Magnesite brick	76.00
Chem. bonded magnesite	65.00

Fluorspar

Washed gravel, duty pd., tide, net ton	nominal
Washed gravel, f.o.b. Ill., Ky., net ton, carloads, all rail	$25.00
Do., barge	25.00
No. 2 lump	25.00

Ferroalloy Prices

Ferromanganese, 78-82%, Carlots, duty pd., seab'd $120.00; Carlots, del. Pittsburgh 125.33; Carlots, f.o.b. So. f'ces. 140.00. Add $10 for ton, $13.50 for less ton, $18 for less than 200-lb. lots.

Spiegeleisen, 19-21%, gross ton, Palmerton $36.00

Manganese Briquets, Contract carloads, bulk freight allowed, per lb. 5.50c; Packed 5.75c; Ton lots 6.00c; Less-ton lots 6.25c; Less 200-lb. lots 6.50c. Spot ¼c higher.

Manganese Electro, 99.9+%, less car lots 42.00c

Chromium Metal, per lb. contained chromium

	Contract	Spot
98% Cr. ton lots	80.00c	85.00c
88% Cr. ton lots	79.00c	84.00c

Ferrocolumbium, 50-60% f.o.b. Niagara Falls, per lb. contained Cb on contract $2.25; Less-ton lots 2.30 (Spot 10c higher)

Chromium Briquets, per lb., freight allowed

	Contract	Spot
Carlots	8.25c	8.50c
Packed	8.50c	8.75c
Ton lots	8.75c	9.00c
Less-ton lots	9.00c	9.25c
Less 200 lbs.	9.25c	9.50c

Ferrochrome, 66-70%, freight allowed, 4-6% carbon, per pound contained (chrome) Carloads 13.00c; Ton lots 13.75c; Less-ton lots 14.00c; Less than 200-lb. lots 14.25c

67-72%, low carbon, cts. per pound:

	Car loads	Ton lots	Less ton	Less 200 lbs.
2% C.	19.50	20.25	20.75	21.00
1% C.	20.50	21.25	21.75	22.00
0.20% C.	21.50	22.25	22.75	23.00
0.10% C.	22.50	23.25	23.75	24.00

Spot is ¼c higher.

Ferromolybdenum, 55-75%, per lb. contained molybdenum, f.o.b. furnace 95.00c

Calcium Molybdate (Molyte), 40-45% Mo., per lb. contracts, f.o.b. producers plant 80.00c

Molybdic Oxide Briquets, 48-52% Mo. per lb. contained, f.o.b. producers plant 30.00c

Molybdenum Oxide, (In 5 and 20 lb. mo. contained cans) 53-63 mo. per lb. contained f.o.b. producers' plants 80.00c

Molybdenum Powder, 99%, f.o.b. York, Pa., per lb. in 200-lb. kegs $2.60; Do., 100-200 lb. lots 2.75; Do., under 100-lb. lots 3.00

Ferrophosphorus, .17-19%, gross ton carloads, f.o.b. sellers' works, $3 unitage, freight equalized with Rockdale, Tenn. for 18% phos. Contract $58.50; Spot 62.25

23-26%, $3 unitage, freight equalized with Mt. Pleasant, Tenn., for 24% phos. Contract 75.00; Spot 80.00

Ferrosilicon, Gross tons, freight allowed, bulk

	Carloads	Ton lots
50%	$ 74.50	$87.00
Unitage	1.50	1.75
75%	135.00	151.00
Unitage	1.80	2.00
85%	170.00	188.00
Unitage	2.00	2.20
90-95%	10.25c	11.25c

(Above for contracts; spot ¼c higher)

Silicon Metal, Spot ¼-cent higher (Per Lb., Contracts):

	1% Iron	2% Iron
Carlots	14.50c	13.00c
Ton lots	15.00c	13.50c
Less-ton lots	15.25c	13.75c
Less 200 lbs.	15.50c	14.00c

Silicon Briquets, Contract carloads, bulk freight allowed, per ton $74.50; Packed 80.50; Ton lots 84.50; Less-ton lots, per lb. 4.00c; Less 200-lb. lots 4.25c. Spot ¼c higher on less ton lots; $5 higher on ton lots and over.

Silicomanganese,

	Carbon 1½%	Carbon 2½%
Carloads (contract)	$128.00	$118.00
Ton Lots (contract)	140.50	130.50

Freight allowed spot $5 above contract

Ferrotungsten, (All prices nominal) Carlots, per lb. contained tungsten $1.90

Tungsten Metal Powder, (Prices Nominal) 98-99 per cent, per pound, depending upon quantity $2.60-$2.65

Ferrotitanium, 40-45%, f.o.b. Niagara Falls, per lb. contained in ton lots $1.23; Less ton lots 1.25

20-25%, C. 0.10 max., in ton lots per lb. contained Ti 1.35; Less-ton lots 1.40 (Spot 5c higher)

Ferro-Carbon-Titanium, 15-20% Titanium,

	6-8% C	3-5% C
Carlots, contract, f.o.b. Niagara Falls, freight allowed to destinations east of Mississippi and north of Baltimore and St. Louis	$142.50	$157.50

Ferrovanadium, 35-40%, contract per pound contained vanadium $2.70-$2.80-$2.90 (Spot 10c higher)

Vanadium Pentoxide, Per lb. contained, contracts $1.10; Do., spot 1.15

Zirconium Alloy, 12-15%, carloads, contract, bulk $102.50; Packed 107.50; Ton lots 108.00; Less ton lots 112.50. Spot $5 a ton higher

35-40%, contract, carloads, bulk or package, per lb. alloy 14.00c; Do., ton lots 15.00c; Do., less-ton lots 16.00c. Spot is ¼-cent higher

Alsifer, Per lb., f.o.b. Niagara Falls.

	Contract	Spot
Carlots	7.50c	8.00c
Ton lots	8.00c	8.50c

Simanal, Per lb. of alloy, contracts, freight allowed (approx. 20% Si, 20% Mn, 20% Al)

Carlots	Ton Lots	Less Ton Lots
10.50c	11.00c	11.50c

WAREHOUSE STEEL PRICES

Base Prices in Cents Per Pound, Delivered Locally, Subject to Prevailing Differentials. As of April 16, 1941

As Kansas City, Mo., Chattanooga, Tenn., Tulsa, Okla., and Portland, Oreg., were not named in the order fixing ceiling prices they have been omitted below.

	Soft Bars	Hot-rolled Strip Bands	Hot-rolled Strip Hoops	Plates ¼-in. & Over	Structural Shapes	Floor Plates	Sheets Hot Rolled	Sheets Cold Rolled	Sheets Galv. No. 24	Cold Rolled Strip	Cold Drawn Bars Carbon	Cold Drawn Bars S.A.E. 2300	Cold Drawn Bars S.A.E. 3100
Boston	3.98	4.06	5.06	3.85	3.85	5.66	3.71	4.68	5.11	3.46	4.13	8.88	7.23
New York (Met.)	3.84	3.96	3.96	3.76	3.75	5.56	3.58	4.60	5.00	3.51	4.09	8.84	7.19
Philadelphia	3.85	3.95	4.45	3.55	3.55	5.25	3.55	4.05	4.65	3.31	4.06	8.56	7.16
Baltimore	3.85	4.00	4.35	3.70	3.70	5.25	3.50	....	5.05	....	4.04	....	....
Norfolk, Va.	4.00	4.10	....	4.05	4.05	5.45	3.85	....	5.40	....	4.15	....	....
Buffalo	3.35	3.82	3.82	3.62	3.40	5.25	3.25	4.30	4.75	3.52	3.75	8.40	6.75
Pittsburgh	3.35	3.60	3.60	3.40	3.40	5.00	3.35	....	4.65	....	3.65	8.40	6.75
Cleveland	3.25	3.50	3.50	3.40	3.58	5.18	3.35	4.05	4.62	3.20	3.75	8.40	6.75
Detroit	3.43	3.43	3.68	3.60	3.65	5.27	3.43	4.30	4.84	3.40	3.80	8.70	7.05
Omaha	4.10	4.20	4.20	4.15	4.15	5.75	3.85	5.32	5.50	....	4.42	....	....
Cincinnati	3.60	3.67	3.67	3.65	3.68	5.28	3.42	4.37	4.92	3.45	4.00	8.75	7.10
Chicago	3.50	3.60	3.60	3.55	3.55	5.15	3.25	4.10	4.85	3.50	3.75	8.40	6.75
Twin Cities	3.75	3.85	3.85	3.80	3.80	5.40	3.50	4.35	5.00	3.83	4.34	9.09	7.44
Milwaukee	3.63	3.53	3.53	3.68	3.68	5.28	3.38	4.23	4.98	3.54	3.88	8.38	6.98
St. Louis	3.64	3.74	3.74	3.69	3.69	5.29	3.39	4.24	4.99	3.61	4.02	8.77	7.12
Indianapolis	3.60	3.75	3.75	3.70	3.70	5.30	3.45	....	5.01	....	3.97	....	....
Memphis	3.90	4.10	4.10	3.95	3.95	5.71	3.85	....	5.25	....	4.31	....	....
Birmingham	3.50	3.70	3.70	3.55	3.55	5.93	3.45	....	4.75	....	4.43	....	....
New Orleans	4.00	4.10	4.10	3.80	3.80	5.75	3.85	....	5.25	5.00	4.60	....	....
Houston, Tex.	3.75	4.30	4.30	4.05	4.05	5.50	4.00	....	5.25	....	6.90	....	....
Seattle	4.35	4.35	.	4.35	4.35	6.10	4.35	6.35	5.60	....	5.75	....	..
Los Angeles	4.50	4.95	6.80	4.50	4.50	6.75	4.65	6.50	5.85	....	6.10	10.55	9.55
San Francisco	4.10	4.60	6.35	4.25	4.25	5.95	4.25	6.40	6.00	..	6.80	10.80	9.80

	S.A.E. Hot-rolled Bars (Unannealed) 1035-1050	2300 Series	3100 Series	4100 Series	6100 Series
Boston	4.28	7.75	6.05	5.80	7.90
New York (Met.)	4.04	7.60	5.90	5.65	....
Philadelphia	4.10	7.56	5.86	5.61	8.56
Baltimore	4.45	....	....	....	....
Norfolk, Va.	....	....	....	....	....
Buffalo	3.55	7.35	5.65	5.40	7.50
Pittsburgh	3.40	7.45	5.75	5.50	7.60
Cleveland	3.30	7.55	5.85	5.85	7.70
Detroit	3.48	7.67	5.97	5.72	7.19
Cincinnati	3.65	7.69	5.99	5.74	7.84
Chicago	3.70	7.35	5.65	5.40	7.50
Twin Cities	3.95	7.70	6.00	6.09	8.19
Milwaukee	3.83	7.33	5.88	5.63	7.73
St. Louis	3.84	7.72	6.02	5.77	7.87
Seattle	6.25	....	8.00	7.85	8.65
Los Angeles	4.80	9.55	8.55	8.40	8.80
San Francisco	5.60	9.80	8.80	8.65	9.05

BASE QUANTITIES

Soft Bars, Bands, Hoops, Plates, Shapes, Floor Plates, Hot Rolled Sheets and SAE 1035-1050 Bars: Base, 400-1999 pounds; 300-1999 pounds in Los Angeles; 400-39,999 (hoops, 0-299) in San Francisco; 300-4999 pounds in Portland; 300-9999 Seattle; 400-14,999 pounds in Twin Cities; 400-3999 pounds in B'ham., Memphis.

Cold Rolled Sheets: Base, 400-1499 pounds in Chicago, Cincinnati, Cleveland, Detroit, New York, Omaha, Kansas City, St. Louis; 450-3749 in Boston; 500-1499 in Buffalo; 1000-1999 in Philadelphia, Baltimore; 750-4999 in San Francisco; 300-4999 in Portland, Seattle; any quantity in Twin Cities, New Orleans; 300-1999 Los Angeles.

Galvanized Sheets: Base, 150-1499 pounds, New York; 150-1499 in Cleveland, Pittsburgh, Baltimore, Norfolk; 150-1049 in Los Angeles; 300-4999 in Portland, Seattle; 450-3749 in Boston; 500-1499 in Birmingham, Buffalo, Chicago, Cincinnati, Detroit, Indianapolis, Milwaukee, Omaha, St. Louis, Tulsa; 3500 and over in Chattanooga; any quantity in Twin Cities; 750-1500 in Kansas City; 150 and over in Memphis; 25 to 49 bundles in Philadelphia; 750-4999 in San Francisco.

Cold Rolled Strip: No base quantity; extras apply on lots of all size.

Cold Finished Bars: Base, 1500 pounds and over on carbon, except 0-299 in San Francisco, 500-999, Los Angeles, 1000 and over in Portland, Seattle; 1000 pounds and over on alloy, except 0-4999 in San Francisco.

SAE Hot Rolled Alloy Bars: Base, 1000 pounds and over, except 0-4999, San Francisco; 0-1999, Portland, Seattle.

EUROPEAN IRON, STEEL PRICES

Dollars at $4.02½ per Pound Sterling

Export Prices f.o.b. Port of Dispatch—

By Cable or Radio

	BRITISH Gross Tons f.o.b. U.K. Ports	£	s	d
Merchant bars, 3-inch and over	$66.50	16	10	0
Merchant bars, small, under 3-inch, re-rolled	3.60c	20	0	0
Structural shapes	2.95c	15	10	0
Ship plates	2.90c	16	2	6
Boiler plates	3.17c	17	12	6
Sheets, black, 24 gage	4.00c	22	5	0
Sheets, galvanized, corrugated, 24 gage	4.61c	25	12	6
Tin plate, base box, 20 x 14, 108 pounds	$ 6.20	1	10	9

British ferromanganese $120.00 delivered Atlantic seaboard duty-paid.

Domestic Prices Delivered at Works or Furnace—

	£	s	d
Foundry No. 3 Pig Iron, Silicon 2.50—3.00	$25.79	6	8 0(a)
Basic pig iron	24.28	6	0 6(a)
Furnace coke, f.o.t. ovens	7.56	1	17 6
Billets, basic soft, 100-ton lots and over	49.37	12	5 0
Standard rails, 60 lbs. per yard, 500-ton lots & over	2.61c	14	10 6
Merchant bars, rounds and squares, under 3-inch	3.17c	17	12 0††
Shapes	2.77c	15	8 0††
Ship plates	2.91c	16	3 0††
Boiler plates	3.06c	17	0 6††
Sheets, black, 24 gage, 4-ton lots and over	4.10c	22	15 0
Sheets, galvanized 24 gage, corrugated, 4-ton lots & over	4.70c	26	2 6
Plain wire, mild drawn, catch weight coils, 2-ton lots and over	4.28c	25	15 0
Bands and strips, hot-rolled	3.30c	18	7 0

(a) del. Middlesbrough 5s rebate to approved customers. ††Rebate 15s on certain conditions.

Ores

Lake Superior Iron Ore

Gross ton, 51½% Lower Lake Ports

Old range bessemer	$4.75
Mesabi nonbessemer	4.45
High phosphorus	4.35
Mesabi bessemer	4.60
Old range nonbessemer	4.60

Eastern Local Ore

Cents, unit, del. E. Pa.

Foundry and basic 56-63%, contract	12.00

Foreign Ore

Cents per unit, c.i.f. Atlantic ports

Manganiferous ore, 45-55% Fe., 6-10% Mang.	Nom.
N. African low phos.	Nom.
Spanish, No. African basic, 50 to 60%	Nom.
Chinese wolframite, net ton, duty pd.	$24.00
Brazil iron ore, 68-69% ord.	7.50c
Low phos. (.02 max.) F.O.B. Rio Janeiro	8.00c
Scheelite, imp.	23.50-24.00

Chrome Ore

Gross ton c.i.f. Baltimore; dry basis; subject to penalties for guarantees

Indian and African, 2.8:1 lump, 48%	$39.00
South African (excluding war risk) No ratio lump, 44%	28.00
Do. 45%	29.00
Do. 48%	34.00
Do. concentrates, 48%	33.00
Do. 50%	34.00
Brazilian	
2.5:1 lump, 44%	31.00
2.8:1 lump, 44%	32.50
3:1 lump, 48%	41.00
No ratio lump, 48%	35.00-35.50
Do. concentrate, 48%	33.00-33.50
Philippine	
No ratio lump, 45%	32.00
2.8:1 lump, 48%	40.00
Do., concentrate, 48%	39.00
2.5:1 concentrate, 48%	36.50
No ratio concentrate, 48%	34.00
No ratio lump, 48%	35.00
Rhodesian	nominal

Manganese Ore

Including war risk but not duty, cents per unit cargo lots

Caucasian, 50-52%	
S. African, 48%	65.00
Indian, 50%	66.00
Brazilian, 48%	65.00
Chilean, 48%	68.00
Cuban, 51%, duty free	81.00-83.00

Molybdenum

Sulphide conc., lb., Mo. cont., mines	$0.75

MAXIMUM PRICES FIXED BY OPA ON IRON AND STEEL SCRAP

Other than railroad grades quoted on the basis of basing point prices from which shipping point prices and consumers' delivered prices are to be computed. Scrap originating from railroads quoted delivered to consumers' plants located on the line of the railroad from which the material originated. All prices in gross tons. A basing point includes its switching district.

PRICES FOR OTHER THAN RAILROAD SCRAP

				ELECTRIC FURNACE AND FOUNDRY GRADES										
				Low Phos. Grades										
	OPEN HEARTH GRADES*	Machine Shop Turnings	BLAST FURNACE GRADES*	Billet, Bloom Forge Crops	Bar Crops and smaller; Punchings, Plate	Heavy Structural, Plate 3 ft. and less	2 ft. and less	1 ft. and less	Cut Auto Scrap 3 ft. and less	2 ft. and less	1 ft. and less	Alloy-Free Low Phos. & Sulphur Turnings	First Cut Heavy Axle & Forge Turnings	Electric Furnace Bundles
Pittsburgh, Brackenridge, Butler, Johnstown, Midland, Monessen, Sharon, Steubenville, Weirton, Canton, Youngstown, Warren	$20.00	$16.00	$16.00	$25.00	$22.50	$21.00	$21.50	$22.00	$20.00	$20.50	$21.00	$18.00	$19.50	$21.00
Claymont, Coatesville, Harrisburg, Conshohocken, Phoenixville	18.75	14.75	14.75	23.75	21.25	19.75	20.25	20.75	18.75	19.25	19.75	16.75	18.25	19.75
Bethlehem	18.25	14.25	14.25	23.25	20.75	19.25	19.75	20.25	18.25	18.75	19.25	16.25	17.75	19.25
Buffalo	19.25	15.25	15.25	24.25	21.75	20.25	20.75	21.25	19.25	19.75	20.25	17.25	18.75	20.25
Cleveland, Middletown, Cincinnati, Portsmouth, Ashland	19.50	15.50	15.50	24.50	22.00	20.50	21.00	21.50	19.50	20.00	20.50	17.50	19.00	20.50
Detroit	17.85	13.85	13.85	22.85	20.35	18.85	19.35	19.85	17.85	18.35	18.85	15.85	17.35	18.85
Toledo	.....	13.85	13.85	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Chicago	18.75	14.75	14.75	23.75	21.25	19.75	20.25	20.75	18.75	19.25	19.75	16.75	18.25	19.75
Kokomo	18.25	14.25	14.25	23.25	20.75	19.25	19.75	20.25	18.25	18.75	19.25	16.25	17.75	19.25
Duluth	18.00	14.00	14.00	23.00	20.50	19.00	19.50	20.00	18.00	18.50	19.00	16.00	17.50	19.00
St. Louis	17.50	13.50	13.50	22.50	20.00	18.50	19.00	19.50	17.50	18.00	18.50	15.50	17.00	18.50
Birmingham, Atlanta, Alabama City, Los Angeles, San Francisco, Pittsburg, Calif.	17.00	13.00	13.00	22.00	19.50	18.00	18.50	19.00	17.00	17.50	18.00	15.00	16.50	18.00
Minnequa, Colo.	16.50	12.50	12.50	21.50	19.00	17.50	18.00	18.50	16.50	17.00	17.50	14.50	16.00	17.50
Seattle	14.50	10.50	10.50	19.50	17.00	15.50	16.00	16.50	14.50	15.00	15.50	12.50	14.00	15.50
Portland, Oreg.	.....	.....	.....	.....	15.50	14.00	14.50	15.00	13.00	13.50	14.00	11.00	12.50	14.00

RAILROAD SCRAP

	Heavy Melting Steel	Scrap Rails	Rails for Rolling	Scrap Rails 3 ft. and under	Scrap Rails 2 ft. and under	Scrap Rails 18 in. and under
Pittsburgh, Wheeling, Steubenville, Sharon, Youngstown, Canton	21.00	22.00	23.50	24.00	24.25	24.50
Philadelphia, Wilmington, Sparrows Point	19.75	20.75	22.25	22.75	23.00	23.25
Cleveland, Cincinnati, Middletown, Ashland, Portsmouth	20.50	21.50	23.00	23.50	23.75	24.00
Chicago	19.75	20.75	22.25	22.75	23.00	23.25
Buffalo	20.25	21.25	22.75	23.25	23.50	23.75
Detroit	18.85	19.85	21.35	21.85	22.10	22.35
Kokomo	19.25	20.25	21.75	22.25	22.50	22.75
Duluth	19.00	20.00	21.50	22.00	22.25	22.50
Kansas City, Mo.	17.00	18.00	19.50	20.00	20.25	20.50
St. Louis	18.50	19.50	21.00	21.50	21.75	22.00
Birmingham	18.00	19.00	20.50	21.00	21.25	21.50
Los Angeles, San Francisco	18.00	19.00	20.50	21.00	21.25	21.50
Seattle	15.50	16.50	18.00	18.50	18.75	19.00

CAST IRON SCRAP OTHER THAN RAILROAD

(Shipping point prices in gross tons)

	Group A	Group B	Group C
No. 1 Cupola Cast	$18.00	$19.00	$20.00
No. 1 Machinery Cast, Drop Broken, 150 lbs. & Under	18.00	19.00	20.00
Clean Auto Cast	18.00	19.00	20.00
Stove Plate	17.00	18.00	19.00
Unstripped Motor Blocks	17.50	18.50	19.50
Heavy Breakable Cast	15.50	16.50	17.50
Charging Box Size Cast	17.00	18.00	19.00
Miscellaneous Malleable	20.00	21.00	22.00

Group A includes the states of Montana, Idaho, Wyoming, Nevada, Utah, Arizona and New Mexico.

Group B includes the states of North Dakota, South Dakota, Nebraska, Colorado, Kansas, Oklahoma, Texas and Florida.

Group C includes states not named in groups A and B, plus Kansas City, Kans.-Mo.

***Open Hearth Grades** refer to No. 1 heavy melting steel, No. 1 hydraulic compressed black sheet scrap, No. 2 heavy melting steel, dealers' No. 1 bundles, dealers' No. 2 bundles and No. 1 busheling. **Blast Furnace Grades** refer to mixed borings and turnings, shoveling turnings, No. 2 busheling and cast iron borings. Add $3 for chemical borings, $5 when chemical borings used in manufacture of explosives.

A basing point includes the switching district of the city named. The Pittsburgh basing point includes the switching districts of Bessemer, Homestead, Duquesne, Munhall and McKeesport, Pa. Cincinnati basing point includes the switching district of Newport, Ky. St. Louis basing point includes the switching districts of Granite City, East St. Louis and Madison, Ill. San Francisco basing point includes the switching districts of South San Francisco, Niles and Oakland, Calif.

Inferior Grades: Maximum prices of inferior grades shall continue to bear the same differential below the corresponding listed grades as existed from Sept. 1, 1940, to Jan. 31, 1941. No premium allowed on grades considered superior, unless approved by OPA. Addition of special preparation charges prohibited. Purchase of electric furnace or foundry grades for open hearth or blast furnace use permitted only at no more than price for corresponding open hearth grade. Exceptions: Low phos. billet, bloom and forge crops and electric furnace bundles may exceed open hearth price, and electric furnace bundles may exceed blast furnace price, if material is delivered to the consumer direct from the original industrial producer.

Commissions: No commission is payable except by a consumer to a broker for services rendered, the commission not to exceed 50 cents per gross ton. No commission is payable unless: The broker guarantees the quality and delivery of an agreed tonnage the scrap is purchased at a price no higher than the maximum allowed; the broker sells the scrap to the consumer at the same price at which he purchased it; the broker does not split the commission with the seller of the scrap, with another broker or sub-broker, or with the consumer. No commission is payable for preparation of scrap.

Maximum Shipping Point Price: Where shipment to consumer is by rail, vessel or combination of both, scrap is at its shipping point when it has been placed f.o.b. railroad car or f.a.s. vessel. In such cases, maximum shipping point prices are: (1) For shipping points located within a basing point, the price listed in the above table for scrap at the basing point in which the shipping point is located, minus the lowest established switching charge for scrap within the basing point; and (2) for shipping points located outside a basing point, the price in the above table for scrap at the most favorable basing point, minus the lowest transportation charge by rail, water or combination thereof. When vessel movement is involved, dock charges shall be 50 cents at Memphis, $1 at Great Lakes ports, $1.25 at New England ports, 75 cents elsewhere. New England shipping point prices computed on most favorable basing point prices; maximum transportation charge on scrap from New England, $6.27 per ton.

Scrap shipped by motor vehicle is at its shipping point when loaded. For shipping points within basing points, maximum is price listed in table minus lowest switching charge. When outside basing point, maximum is price at most favorable basing point minus lowest established charge when hauled by common carrier. When hauled by seller charges are based on carload rate for rail shipment, minimum $1.00 per ton.

Maximum Delivered Prices: Determined by adding established transportation charges to shipping point price, not to exceed by more than $1 the prices listed in the table for the nearest basing point. Certain exceptions specified in OPA Price Schedule No. 4 (Amendment 11) apply to St. Louis district consumers, to WPB allocations, to water shipments from Duluth or Superior, Wis., to shipments of billets, blooms and forge crops from Pittsburgh and to shipments of electric and foundry grades from Michigan.

Unprepared Scrap: Above prices are for prepared scrap. Maximum prices for unprepared scrap are $2.50 less than for the corresponding grades of prepared scrap, except for heavy breakable cast. In no case shall electric furnace and foundry grades be used as the "corresponding grade or grades of prepared scrap." Graveyard autos not considered unprepared scrap.

Remote Scrap: Consists of all grades, except railroad scrap, located in Florida, Montana, Idaho, Wyoming, Nevada, Arizona, New Mexico, Texas, Oklahoma, Oregon and Utah. Delivered price may exceed by not more than $5 the price at the basing point nearest consumer's plant, provided sworn details furnished OPA. Permission required to exceed by more than $5 the nearest basing point price.

Sheets, Strip

Sheet & Strip Prices, Page 120

Sheet shipments so far in March show a stronger trend toward higher priorities than in February. Cessation of manufacture of household appliances, normally large sheet consumers, has not affected sheet demand materially as conversion of these plants to war manufacture calls for large supplies. Scheduling for April production indicates no pressure relief.

Rapid diversion of strip mill capacity to plates is the principal cause of present sheet stringency, which is reflected in the fact that producers have little to offer on hot-rolled under eight weeks on A-1-a priority.

Andrews Steel Co., Newport, Ky., was idle last week to install improvements in soaking pits and other equipment, which curtailed sheet production sharply. Resumption this week will be at capacity, to make up lost tonnage as soon as possible.

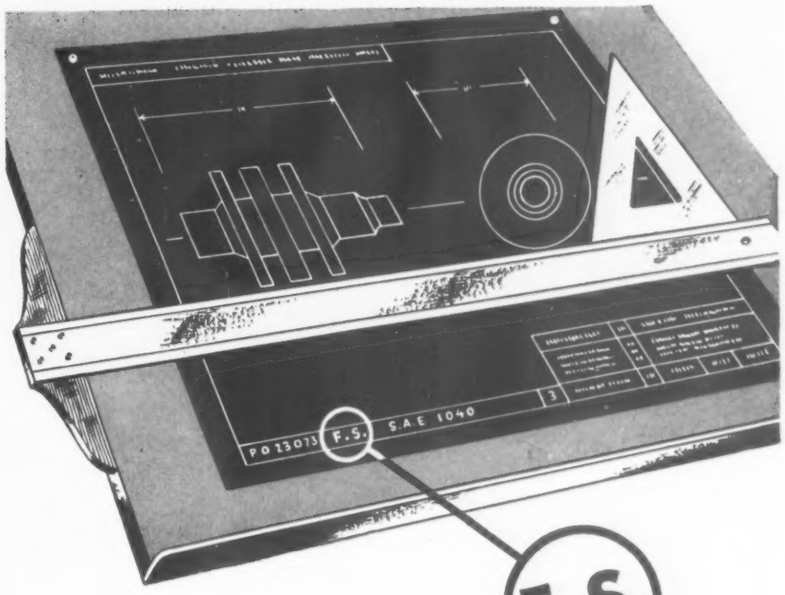
Southern strip-mill capacity is being converted to plate production as rapidly as possible and probably not more than 40 per cent of former sheet capacity is engaged on that product.

Production of galvanized sheets has declined two points to 50 per cent of capacity. This compares with 73 per cent for the same week last year and 53 per cent two years ago. The rate this year has ranged between 49 and 54 per cent, with an average of 51.4 per cent, compared with 78.6 per cent for the comparable period last year.

While sheet sellers feel compelled to accept many of the low priority tonnages being offered, in practically no case do they attempt to promise definite delivery. In fact, unless the tonnage is allocated to them, they are usually unable to make promises on any order carrying less than a A-1-j classification, and some do not attempt to do even that. On A-1-a ratings the general average promise is around eight weeks on hot and cold sheets. While inquiry is heavy, sellers assert that stringency may be attributed more to diversion of continuous mill capacity to strip plate.

Conversion of production for war requirements results in widespread changes in buying of steel sheets. Some consumers are on mill books for the first time with high ratings while other shops normally using one finish have switched to others. On high ratings, deliveries on cold-rolled are somewhat better than for other grades, although this advantage is narrowing. Not much volume, even for forward delivery, is being taken below A-9. Heavy demand for painted galvanized sheets, also galvanized corrugated, for paneled-wall buildings, largely for export, limits available supplies in other directions.

Numerous New England shops are estimating contracts for ammunition boxes and lockers while inquiry also includes 750,000 six-compartment mess trays, A-1-a rating, and many thousands of galvanized buckets, both for the navy.



When You Write F.S. on the Drawing

When you finish up the drawing, write in the piece number and add F.S. SAE 1040, the "F.S." isn't just an afterthought. You've spent a lot of time on design, checked stresses and bearing values and worked out a number of associated parts.

You have a right to expect that the manufacture of the steel for the forging will be carefully controlled, and that the processes of forging and heat treatment of the piece will be in the hands of well trained experienced men.

Standard Steel has the equipment and the personnel to assure careful control from open hearth to finished forging.

Are you getting full value in *your* forgings? Specify Standard and be sure of it.

STANDARD STEEL WORKS

BLW THE BALDWIN GROUP

DIVISION OF
THE BALDWIN LOCOMOTIVE WORKS
PHILADELPHIA

Plates

Plate Prices, Page 121

Pressure on plate mills is maintained, shipbuilding requirements being the largest factor. Deliveries are being made on essential war work close to schedule and distribution is being more closely supervised to prevent accumulation.

Heavy tonnages for synthetic rubber plants and gasoline refineries are appearing, calling particularly for sheared plates. This is being met the more easily because of use of much strip-plate in merchant ships and freight cars, which has relieved sheared plate mills of considerable tonnage.

Last week orders for strip-plate for Liberty ships started flowing more freely and indications point to enlarged use of this product in other merchant ships as it is estimated 85 per cent of plates for this class of craft can be rolled on strip mills.

In some cases, because of heavy plate demand, some industrial projects are using wrought iron plates, in spite of higher prices, deliveries being somewhat better than for sheared plates, about six weeks on ratings of A-3 or higher.

New England plate fabricators have large contracts for pontoons, airfield fuel system tanks, mainly 25,000-gallon capacity, and buoys.

Southern plate mills are struggling under a heavy load of orders for shipbuilding and freight car construction. Backlogs on plate mill books are at the highest level ever attained.

Bars

Bar Prices, Page 120

Deliveries on carbon bars of A-1-a rating are at about eight weeks, depending somewhat on specifications, though some producers can not do better than ten weeks. Hot-rolled alloy bars with A-1-a priority, but untreated, are available in 15 to 16 weeks, a slightly better schedule than offered a few months ago, due to increased capacity.

On ratings of A-3 or better, some producers of cold-rolled bars can deliver in six to eight weeks, demand increasing sharply for armaments. For shells buying of high manganese open-hearth steel in the 1300 series subject to heat-treating and alloys for armor-piercing projectiles is up substantially, the latter being mostly allocated. Most sellers are taking no more unrated orders. On fixed contracts for known government shop needs, orders are in for third quarter delivery, including steel bars for rifle barrels and remelting stock.

Dependent on an A-10 rating for repair parts and maintenance, builders of textile mill equipment in New England are taking on prime war contracts with high priorities, one to produce 75-mm. guns, while a machinery builder is also making guns from forgings purchased in Pennsylvania. Heavy consumption by screw machines bolsters demand for cold-finished and bessemer. Forging shops are at capacity on war work, including aircraft, monthly consumption of forging stock in some instances being equal to annual requirements previous to the emergency.

Carbon bar consumers report that mill deliveries are becoming more extended, with eight to 10 weeks about the best they can do. Broadly speaking, there has been greater extension of shipments recently on the smaller rounds than the larger, as a fact attributed to greater emphasis at the moment on small shell production. Deliveries on cold-drawn carbon bars, where cold drawers have hot bars on hand, range around five to six weeks on light rounds and about three on the heavy; however, few have much in the way of stocks, so cold-drawn bar shipments in most cases run well beyond. Necessity for extending priorities in various instances contribute to delay, and often on highly essential tonnage.

Pipe

Pipe Prices, Page 121

Black steel pipe inventories with most distributors are in fair condition, with demand spotty. There is also scattered shading on resale prices. Demand from the plumbing and heating trade is slow, but buying for industrial use is active. Pipe quotas for second quarter will be slightly below the first with most distributors, although there are exceptions. Deliveries on black pipe range from three to six weeks. As with wrought iron pipe, direct mill shipments have been heavier. Several large housing projects take substantial tonnages of pipe, although purchases are not likely before late next quarter.

Permission has been given warehouse operators to compute delivery charges on cast iron soil pipe and fittings in accordance with methods employed Oct. 1, 1941. Amendment No. 1 to revised price schedule No. 100, effective March 7, has been issued for this purpose. This conforms the well established industry practice, which had been changed in the original price order.

Southern cast pipe foundries are converting largely to war materials instead of pipe and it seems likely half the Alabama capacity may be so employed in a short time. Foundries are not engaged at capacity because of lack of pig iron.

CAST PIPE PLACED

1500 tons, estimated, 6 and 10-inch, class 150, water line projects, Spring Lake and Bonnie Doone, S. C., to Lynchburg Foundry Co., Lynchburg, Va.; Boyd & Goforth, Inc., Charlotte, N. C., contractor for both projects.

1200 tons, 6 to 16 inch, including 44,318 feet, 6-inch, class 150, Parker Water and Sewer Sub-district Commission, Greenville, S. C., to American Cast Iron Pipe Co., Birmingham, Ala.; J. E. Sirrine & Co., Greenville, engineers.

CAST PIPE PENDING

1000 tons, 6 to 24 inch, New London, Conn.; bids in.

350 tons, mostly 12-inch, Newport, R. I.

100 tons, housing project at Poulsbo, Wash.; bids in.

Rails, Cars

Track Material Prices, Page 121

Freight car buying is maintained and builders are booking additional lots. Among recent orders is 1000 ballast cars for the Union Pacific. This road and Southern Pacific, joint owners of the Pacific Fruit Express, will place 2000 refrigerator cars shortly and a program is being prepared for rebuilding 2500 refrigerators and heavy repairs to 3000 cars.

Canadian railroads are in the market for cars, 4250 for the Canadian National and 900 for the Canadian Pacific. Some of these cars may be awarded to builders in this country as Canadian shops are well filled.

CAR ORDERS PLACED

American Steel & Wire Co., 65 seventy-ton gondolas, to Magor Car Corp., Passaic, N. J.

Atlantic Refining Co., 8 forty-ton tank cars for Brazil, to Gregg Co. Ltd., New York.

Central of Georgia, 50 fifty-ton hoppers, to Pullman-Standard Car Mfg. Co., Chicago.

Columbus & Southern Ohio Electric Co., 15 trolley coaches, to Pullman-Standard Car Mfg. Co., Chicago.

Grand Trunk Western, 200 auto box, to Pressed Steel Car Co., Pittsburgh.

Linde Air Products Co., 39 seventy-ton box cars, to General American Transportation Corp., Chicago.

Nashville, Chattanooga & St. Louis, 75 seventy-ton gondolas, to Greenville Steel Car Co., Greenville, Pa.

Nashville, Chattanooga & St. Louis, 50 fifty-ton high side gondolas, to Bethlehem Steel Co., Bethlehem.

National Tube Co., 98 seventy-ton gondolas, to Magor Car Corp., Passaic, N. J.

Philadelphia Transportation Co., Philadelphia, ten 40-passenger trackless trolley coaches, to J. G. Brill Co., Philadelphia.

Richmond, Fredericksburg & Potomac, 20 fifty-ton box cars, to Pullman-Standard Car Mfg. Co., Chicago.

Rubber Reserve Co., 50 fifty-ton tank cars, to American Car & Foundry Co., New York.

Union Pacific, 1000 fifty-ton steel Hart selective ballast cars, to American Car & Foundry Co., New York.

War department, 100 fifty-ton tank cars, to American Car & Foundry Co., New York.

CAR ORDERS PENDING

Atchison, Topeka & Santa Fe, 100 sixty-ton flat cars, bids asked.

Canadian National, 4250, contemplated; list comprises 4000 fifty-ton box cars and 250 seventy-ton hopper cars.

Canadian Pacific, 900 cars, contemplated; list comprises 550 fifty-ton box cars, 200 forty-ton box cars and 150 seventy-five-ton ore cars.

Pacific Fruit Express, 2000 refrigerator cars, pending; Union Pacific and Southern Pacific, owners of Pacific Fruit Express, also announce that 2500 refrigerator cars will be rebuilt for this operator and also that heavy repairs will be made to 3000 cars of this type; program will extend throughout 1943 and, including the new cars, will cost $21,000,000.

Sao Paulo Railroad, Brazil, 200 42-metric ton gondolas.

LOCOMOTIVES PLACED

Denver & Rio Grande Western, ten 4-6-6-4 type steam engines, to Baldwin Locomotive Works, Eddystone, Pa.

St. Louis Southwestern, five 4-8-4 type steam locomotives, to its own shops.

two 36-passenger for Conestoga Transportation Co., Lancaster, Pa.; three 33-passenger for Southeastern Greyhound Lines, Lexington, Ky.

Structural Shapes

Structural Shape Prices, Page 121

Although structural shape awards are relatively light a heavy total of work is impending and will be out for bids within a short time. Deliveries on A-1-a priority can be had in about seven weeks, but are extended rapidly on lower preferences.

While plain structural deliveries are sufficient to fill the more important war industry expansions, little tonnage is left for lower rated projects which are subject to indefinite delay. A few have been abandoned or re-designed for wood. Structural mills, because of limited allocations of semifinished, are not engaged at capacity in some instances. Ratio of lighter sections being rolled is greater than usual because of dwindling bridge requirements and the nature of construction required in war plants, although there are exceptions among the latter where heavy machinery is to be installed.

More direct allocated tonnage is coming out for war requirements, both plain and fabricated material, including 2700 tons of angles and plates for floating ponton-barges, the plain material going to Phoenix Iron Co., Phoenixville, Pa., and three shops will fabricate, including Lehigh Structural Steel Co., Walsh-Holyoke Steam Boiler Co., Holyoke, Mass., and one shop on the Pacific Coast.

SHAPE CONTRACTS PLACED

3000 tons, additional plant unit, Sperry Gyroscope Co., to American Bridge Co., Pittsburgh, through Stone & Webster Engineering Co., Boston.

1200 tons, industrial unit, American Locomotive Co., to American Bridge Co., Pittsburgh.

965 tons, additional facilities, contract NOy 4132, supplemental agreement 3, naval station to Steel Construction Co., Birmingham, Ala.; Duval Engineering-Contracting Co. & Associates, Jacksonville, Fla.

650 tons, craneway and alterations, General Motors Corp., to Harris Structural Steel Co., New York.

500 tons, plant of Union Radio Corp., Lansdale, Pa., to Lehigh Structural Steel Co., Allentown, Pa.

400 tons, building, General Electric Co., Lynn, Mass., to Ingalls Iron Works, Birmingham, Ala.

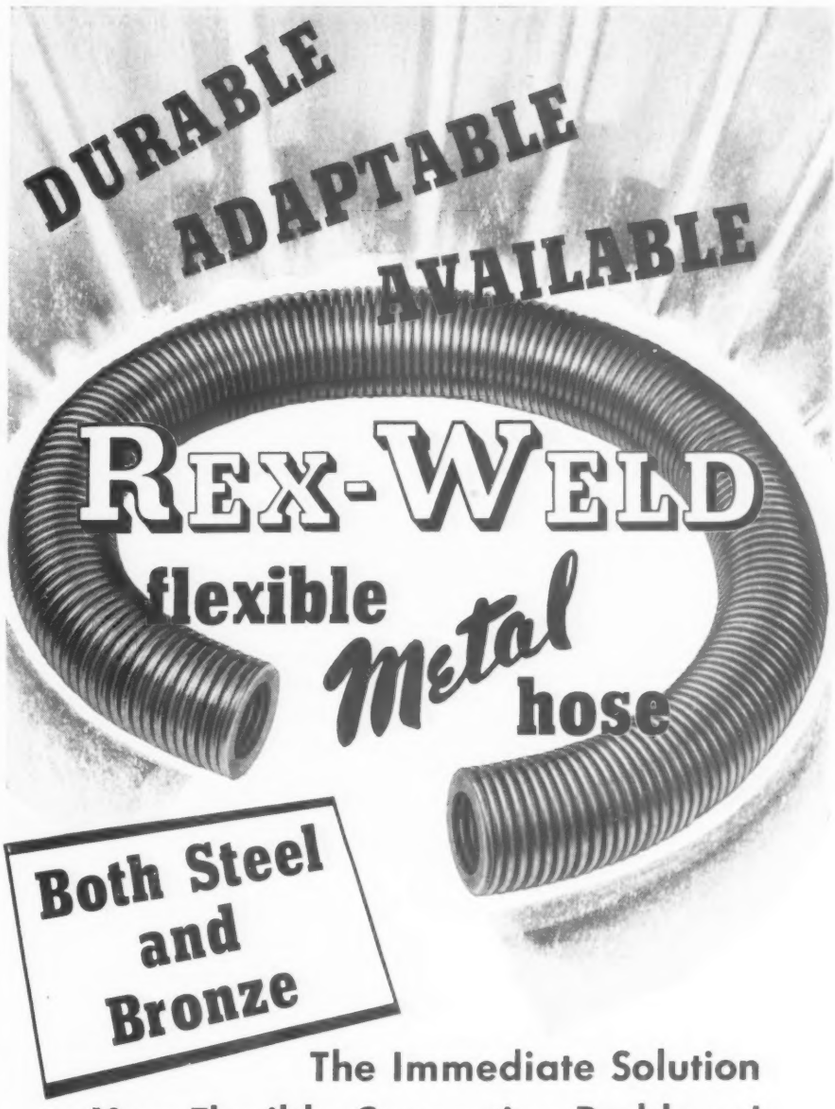
350 tons, underground loop terminal, Washington, to Bethlehem Steel Co., Bethlehem, Pa., through Colmar Construction Co., New York.

302 tons, state bridges, Waubaunsee

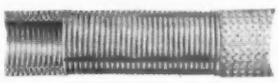
SHAPE AWARDS COMPARED

	Tons
Week ended March 14	8,075
Week ended March 7	16,490
Week ended Feb. 28	28,640
This week, 1941	14,526
Weekly average, 1942	21,577
Weekly average, 1941	27,373
Weekly average, Feb., 1942	26,015
Total, 1941	342,385
Total, 1942	215,770

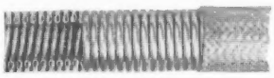
Includes awards of 100 tons or more.



The Immediate Solution to Your Flexible Connection Problems!



Type RW-81 (annular corrugations)



Type RW-91 (helical corrugations)

REX-WELD** (corrugated) **Flexible METAL Hose

Sizes from ⅛" I. D. to 4" I. D. inc. Pressures to 14,500 p.s.i. Temperatures to 1000° F. One-piece, all-metal construction. Continuous lengths to 50 feet.

Rex-Tite Mechanical (Re-attachable) couplings; solder couplings; brazed and welded couplings and flange assemblies for Rex-Weld Flexible Metal Hose.

Complete Data on Request

CHICAGO METAL HOSE CORPORATION

MAYWOOD, ILLINOIS

county, Kansas, 173 tons to Kansas City Structural Steel Co., Kansas City, Mo., and 129 tons to George C. Christopher & Son, Wichita, Kans.; Rhodes Construction Co., Newton, Kans., contractor.

300 tons, oil cracking units, various location; E. R. Badger Co., Boston, contractor.

258 tons, aluminum plant, Salt Lake City, Utah, for Kalunite Inc., to Structural Steel & Forge Co., Salt Lake City, Utah; Leonard Construction Co., Chicago, contractor.

150 tons or more, roof structure for Coulee powerhouse, to Creamer & Dunlap, Tulsa, Okla., low $15,300.

SHAPE CONTRACTS PENDING

3000 tons, expansion, propeller division, Curtiss-Wright Corp., John W. Ryan Construction Co., New York, contractor; bids March 13.

1700 tons, manufacturing plant, Pullman-Standard Car Mfg. Co., Chicago; Kaiser Ducett Co., contractor.

400 tons, alterations, General Electric Co., Fitchburg, Mass.

300 tons, navy yard powerhouse; bids asked.

145 tons, War Department network bridge, Arlington, Va.; taking bids.

Unstated, large hangar for Northwest airport; bids in to United States engineer, Seattle.

Unstated, steel through truss span, 110 feet between bulkheads, for Washington state at Renton; bids soon.

Tin Plate

Tin Plate Prices, Page 121

Tin plate mills, besides facing further restrictions in obtaining supplies of pig tin, continue to be hampered by difficulty in obtaining black plate even from their own sheet or strip mills. Sheet bar production constantly grows more limited as both open-hearth and bessemer steel is diverted to uses deemed more essential for war purposes. Tin mills average an operating rate of 35 to 40 per cent.

Reinforcing Bars

Reinforcing Bar Prices, Page 121

Heavy demand for reinforcing bars is confined almost entirely to war building, with a fair proportion of highway requirements. A contract for 7500 tons for gun emplacements has been divided between two sellers.

Several thousand tons are required for housing projects in New England, two in the Boston district. Delivery delays are expected on these contracts unless higher ratings are given.

Most current volume is in small lots in lower A ratings and large tonnages of highly-rated material.

REINFORCING STEEL AWARDS

7500 tons, gun emplacements, divided Truscon Steel Co., Youngstown, O., and Joseph T. Ryerson & Son Inc., Cambridge, Mass.

4500 tons, powder plant, Hercules Powder Co., divided as follows: 2000 tons to Bethlehem Steel Co., Bethlehem, Pa.; and 625 tons each to W. H. Pipkorn Co., Milwaukee, Carnegie-Illinois Steel Corp., Chicago, Truscon Steel Co., Youngstown, O., and Joseph T. Ryerson & Son Inc., Chicago; Mason & Hanger Co., New York, engineer; bids March 3.

1000 tons, aluminum foundry, Buick Motor Division, General Motors Corp., Flint, Mich., to Calumet Steel Co., Chicago.

270 tons, plant, Shell Oil Co., Wood River, Ill., to Joseph T. Ryerson & Son Inc., Chicago; M. W. Kellogg Co., New York, contractor.

131 tons, linking building, ordnance plant, for War Department, to Ceco Steel Products Corp., Chicago; Viggo Jensen, contractor.

106 tons state highway project 81-20-13-B, Willow Run, Mich., to Great Lakes Steel Corp., Detroit, through Ceco Steel Products Corp.

100 tons, defense project, to Northwest Steel Rolling Mills, Seattle.

100 tons, state bridges, Waubaunsee county, Kansas, to George C. Christopher & Son, Wichita, Kans.; Rhodes Construction Co., Newton, Kans., contractor.

100 tons or more, magazines, roads and depot facilities, Charleston, S. C., to Building Supplies & Service Co., Charleston; C. M. Guest & Sons, Anderson, S. C., contractor.

CONCRETE BARS COMPARED

	Tons
Week ended March 14	13,307
Week ended March 7	9,954
Week ended Feb. 28	2,175
This week, 1941	7,706
Weekly average, 1942	8,239
Weekly average, 1941	13,609
Weekly average, Feb., 1942	3,489
Total, 1941	108,989
Total, 1942	82,393

Includes awards of 100 tons or more.

IT'S MADE OUT OF
SPEED CASE STEEL
A LOW CARBON OPEN HEARTH PRODUCT

–because . . .

It increased production 42%!
It saved $29.64 per ton used
It reduced warpage 75%
It carburized without soft spots

Ductility Plus Machinability (230 SFPM)

THANK YOU! *To friends both old and new . . . thanks for your patience. We are doing our very best for Defense . . . and also for you.*

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THE FITZSIMONS COMPANY
YOUNGSTOWN, OHIO

MANUFACTURERS OF COLD FINISHED CARBON AND ALLOY STEEL BARS

Pig Iron

Pig Iron Prices, Page 122

Requisitions for pig iron for April delivery are slightly higher, several large consumers who have been taking a minimum of iron in recent months, working on inventory, asking for larger allocations. Proportion of requisitions carrying high priority is increasing and volume at A-10 or lower is smaller. An exception is found in the case of several stove plants who are still asking iron on B ratings.

Shipments against March allotments have been prompt and furnaces have been moving output as rapidly as possible to keep melters supplied through the entire month. Needs for vital war production are being met fully although more high priorities are encountered each month.

The New England blast furnace will go out of blast in April for relining and while a substantial reserve has been built up it is likely allocation will be made from a large number of furnaces to meet New England requirements.

In a few instances, the result of the compliance board letter warning against excess requisitions, some schedules have been reduced slightly, but this has been made up by needs from other directions.

Scrap

Scrap Prices, Page 124

Scrap supply is uneven, some districts receiving improved flow while others find supply reduced. In general tonnage is sufficient to continue steelmaking at a fairly level rate, though in some cases production is dependent on day to day receipts. In eastern Pennsylvania one mill has reduced operations to match its scrap supply. At other points open hearths in condition to operate are idle from the same cause.

Material from automobile wrecking yards continues to come out as dealers pass it through their yards for preparation. While the aggregate tonnage from this source is of much assistance in meeting steelmaking demand the total to be realized appears likely to be much below what had been expected. On the other hand, quantity gathered by farm and community drives in some instances has exceeded expectations.

Except for heavy snowfall in some sections milder weather has prevailed and has expedited collection and preparation. Approach of navigation season on the Great Lakes holds hope of considerable tonnage being brought down from head of the lakes to consumers on Lake Erie.

In addition to scrap expected to be uncovered by the statewide drive in Missouri WPA is undertaking to reclaim about 18,000 tons of street railway rails in seven cities in that state. Some of this will entail considerable expense in repaving. Rail tonnages are being uncovered in other sections, as well.

Effects of sharp reduction in scrap from automobile manufacturers is being modified by larger supply of material from war production, although this is not yet sufficient to make up all the loss. Railroad scrap offerings are better, though still smaller than normal, the carriers reserving everything that can be used for repair work.

Foundries are faced with con-

Tool Steel Scrap

Cents per pound, to consumers f.o.b. shipping point

Tungsten Types

(For each 1% tungsten contained)

Solid scrap containing over 12%	1.80c
Solid scrap containing 5 to 12%	1.60
Turnings, millings containing over 12%	1.60
Do., 5 to 12%	1.40
Turnings, millings, solids under 5%	1.25

Molybdenum Types

Solid scrap, not less than 7% molybdenum, 0.50 vanadium	12.50
Turnings, millings, same basis	10.50
Solid scrap, not less than 3% molybdenum, 4% tungsten, 1% vanadium	13.50
Turnings, millings, same basis	11.50

Mixed Scrap

(Molybdenum and Tungsten Types)

Solid scrap, each 1% contained tungsten	1.60
Solid scrap, each 1% molybdenum	.80
Millings, turnings, each 1% tungsten	1.40
Millings, turnings, each 1% molybdenum	.70

WE STILL NEED PLOWSHARES

Although we're straining every resource to build guns, tanks and planes faster and better than ever before, we still have to have plowshares. For America's farms are called upon to produce food in unheard of quantities. Our Armed Forces and those of our Allies, as well as a large part of the world's civilian population are depending on us.

And General Abrasive's NB Lionite is playing an important part. It is the abrasive grain used for polishing plowshares in the plow shops of the United States and Canada. NB Lionite is a tough, hard grain that works exceptionally well with cements. Recent tests in plants using cements have shown production increases of from 25% to 100% when they changed to NB Lionite. When you get more pieces per wheel you not only speed up production but you also conserve important defense materials. Put NB Lionite to work in your plant.

SALES REPRESENTATIVES in All Principal Cities

GENERAL ABRASIVE CO., INC.
NIAGARA FALLS, NEW YORK U. S. A.

tinued severe shortage of cast scrap. A large iron foundry in the East, with war work representing 80 per cent of its output, has cut production drastically because of lack of scrap. This interest has little prospect of improvement as its supplies normally move by barge from other territories and under present OPA schedules such shipments are not possible.

A recent interpretation of the OPA scrap order of last month is that open-hearth operators can not pay more than $17.50, shipping point, for stove plate. This prevents steelmakers from obtaining substantial tonnages of this grade, as they cannot compete with foundries, which are permitted to pay as high as $19.

Pacific Coast

Seattle—The Pacific Northwest is a beehive of activity, plants operating at full capacity and major projects under rush orders. Bids are out for large construction works, many under military secrecy.

Bonneville Power Administration has awarded Allis-Chalmers Mfg. Co., low at $1,196,925, contract for furnishing ten 20,000-kv transformers for Longview station. The same firm has a $42,463 award for supplying circuit breakers for Ampere station. Identical low bids of $783,513, were submitted by Anaconda Wire & Cable Co. and General Cable Corp., New York, for furnishing 2,750,000 feet of conductor and accessories for Coulee-Spokane power lines No. 3 and No. 4. Bonneville has approved allocation of $3,399,210 for construction of two additional 230-kv transmission lines between Coulee and Spokane.

Interior department has awarded a $193,057 contract to General Electric Co. for furnishing main and six unit control boards for Grand Coulee powerhouse. Denver announces Westinghouse Electric & Mfg. Co. is low at $822,610 for ten 36,800-kva transformers for Units L 7, 8 and 9 of the same project.

Possibility of establishment of a coke industry is indicated by incorporation of Wilkeson Products Co. by owners of the Wilkeson coal properties. Plans are in the making for construction of a plant here to produce coke and by-product, using the Curran-Knowles process for distilling chemicals.

Increased shipbuilding construction is planned for the Portland area, announcement being made that the Kaiser Co. Inc. will establish a third plant with ten shipways. This yard reports it has contracts for 70 liberty-type, 10,500-ton deadweight steel ships, each costing $1,600,000.

United States engineer, Seattle, has received bids for a major hangar project in this area, tonnages of shapes and reinforcing unstated.

Rolling mills are struggling under heavy backlogs and accepting new business only from federal agencies. Fabricating plants are booked to capacity, immediate effort being to clear materials required in rush defense jobs. Many large contractors on public works have blanket contracts with mills and shops and are adding to original tonnages as required.

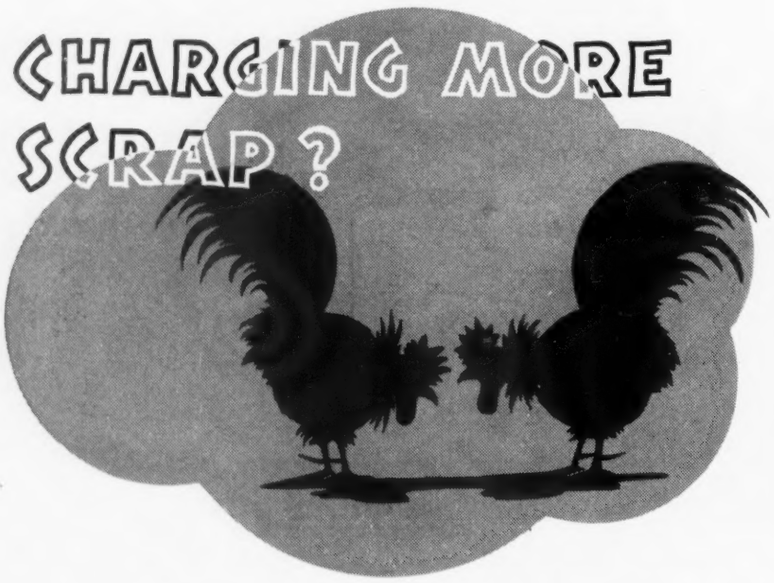
The scrap situation has been clarified by the OPA, which has established a remote territory rule, which has stimulated shipments from the interior and stabilized the market. The present prices are $14.50 for prepared scrap and $12 for unprepared at Seattle, and $13 and $10.50, repectively, in remote territory. The new ceiling has raised prices for interior dealers from $7.50 to $10.50 for unprepared and receipts have greatly increased from January, when stocks on hand were greatly reduced. Mills now report ample inventories. No improvement in the supply of cast iron scrap is reported and some foundries are hard pressed.

Demand for cast iron pipe is restricted by priorities. Several housing and cantonment projects in this area are calling for sizeable tonnages but no important placements were recorded recently.

Warehouse

Warehouse Prices, Page 123

Warehouse trade is restrained by inability to obtain sufficient material from mills and badly broken



If you are charging more scrap in your open hearths to conserve pig iron, use dependable No. 34-30 Mexican Graphite to secure the necessary carbon . . . charged under the lime in basic practice it contains no sulphur, works quietly into the metal giving high carbon recovery . . . stops lime build-up and sticky heats . . . avoids foaming reactions, hot roofs, clogged checkers, long heat time and soft heats . . . Complete particulars mailed you upon request.

THE UNITED STATES GRAPHITE CO.
SAGINAW MICH.

NO. 34-30 MEXICAN GRAPHITE

stocks in practically all forms of steel. Last week a conference was held between the general steel warehouse advisory committee and C. E. Adams, chief, Iron and Steel Branch, WPB. Its purpose was to devise means to assure adequate supply of steel to distributors. General problems discussed included maintenance, quotas on schedule A products, including tubing, tool steel and related products, earmarked stocks of aircraft steel, ship repair needs, disposition of frozen stocks.

Canada

Toronto, Ont.—The recent advance of $5 per ton in steel prices in Canada is still a matter of considerable controversy. The Steel Co. of Canada Ltd. continues to withhold action and has announced no change despite the fact that Dominion Steel & Coal Corp. Ltd., Algoma Steel Corp. Ltd., and other producers have moved their prices upward. The application to the government for the advance was on the ground that producers were operating under unfair conditions in that no increase in price had been put into effect (with the exception of $2 per ton in heavy rails) since the beginning of the war. During that time costs of production, including labor, had risen considerably. The increase in price, however, was authorized on the understanding that it should not be passed along to the general public, and thus affect the price ceiling. It is understood that the government, which is the ultimate consumer of upwards of 90 per cent of the steel produced in Canada, has made some provision whereby war contractors will not have to carry the added burden of the $5 increase against formerly tendered prices, but that the government will absorb the difference.

While Canada's wartime ship construction program is being pushed and shipbuilding yards, in many instances, are at a higher operating speed than formerly, it is stated that some plants still are affected by lack of steel. It is reported that the Toronto Shipbuilding Co., a government owned concern, with contracts for 15 ships, representing expenditure of $13,000,000, is operating three days per week, because no steel is available. A few months ago the company was working 24 hours per day with three shifts.

Most other shipyards in Canada are maintaining high speed operations and in most instances are getting steel, chiefly from the United States. However, the government announced some time ago that it would consentrate on construction of merchant vessels rather than war craft. As the Toronto Shipbuilding Co. is chiefly on corvettes and minesweepers, this may be the reason for its lack of steel as most of the available supply from Canadian mills and imported is being diverted to merchant ship construction.

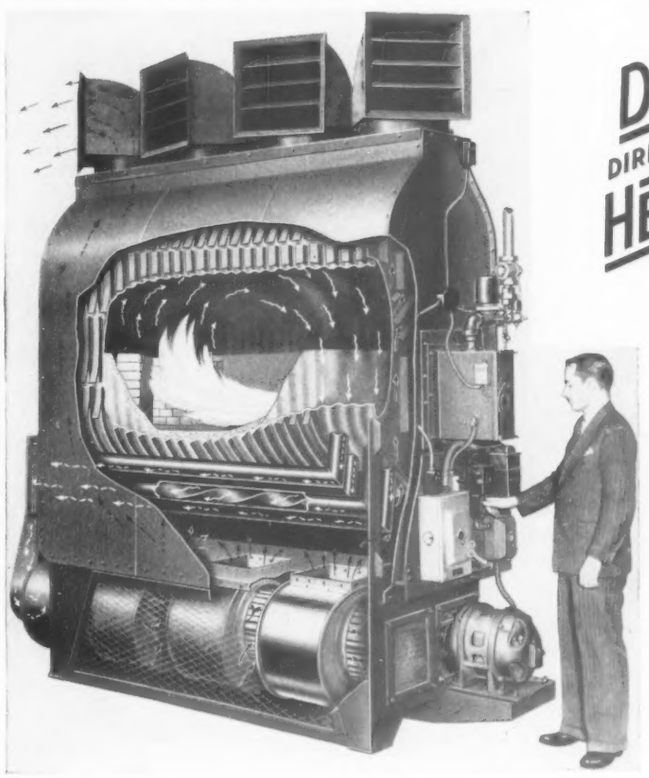
Shortage of plates for shipbuilding, tank construction and other essential production is expected to be relieved to some extent after March 31 when Dominion Steel & Coal Corp. Ltd. starts its 110-inch plate mill at Sydney, N. S. This mill will have an annual rated capacity of 180,000 tons, and is expected to operate close to its maximum.

Restrictions on use of steel, on a much broader scale, have been announced by the Canadian steel controller. Curtailment in use will affect war materials production as well as civilian consumers, and wherever possible, for war or essential civilian production, substitutes must be found. Tin plate is decidedly scarce and producers are steadily curtailing output. Sheets, in heavy demand, will not be available as a substitute as present output is far below actual requirements. Producers of sheets are not accepting orders from other than government sources.

Inquiries for merchant bars are gaining in volume and while mills are accepting orders they will make no definite promise regarding delivery dates. It is stated delivery may be made in anywhere from four to eight months. Tool builders are unable to maintain maximum production, due to insufficient carbon and alloy steel.

While there has been sharp curtailment in civilian construction, due to shortage of structural steel,

When You Need Heat *Quickly...*



DRAVO DIRECT FIRED HEATERS

This Heater is a self-fired unit containing its own combustion chamber as well as the motors and fans to circulate warm air in the space to be heated. It is available for quick delivery in sizes from 700,000 B.t.u. to 1,500,000 B.t.u. One or more heaters of this type can be arranged so as to provide required working temperatures for any size or shape of industrial building. Such a system is much faster to install than a central steam plant and the cost is frequently quite a bit lower, since there is no need for a distribution system of pipes, radiators or diffusers.

Heaters are on hand in stock sizes and can be shipped and installed quickly. Fuels are gas, light and heavy oil or coke oven gas. At the snap of the switch, the warm air starts in circulation. Its high heat transfer efficiency, up to 85%, makes it economical to operate.

These heaters can be installed and connected up in a building that is under construction . . . used for temporary heat and then retained as a permanent heating system.

SEE OUR CATALOG IN SWEET'S

There are three ways to determine if this heater will answer your problems: (1) Refer to Sweet's Catalog; (2) Or write and we will mail you our catalog; (3) Or if you would care to have a sales engineer analyze your problem, without obligation, of course, include request when writing.

DRAVO CORPORATION
Machinery Division — Heater Department
DRAVO BUILDING · PITTSBURGH, PA.
4800 Prospect Ave. Cleveland
Broad St. Station Building Philadelphia

there has been no recession in industrial building, particularly additions to war plants. Structural steel lettings were over 10,000 tons for the week, all associated with war activities. According to announcements of proposed building projects awards will be made soon for about 25,000 tons.

Merchant pig iron sales have increased slightly to around 10,000 tons, with inquiries well in excess of this total.

With the exception of minor improvement in offerings to dealers little change is reported in the iron and steel scrap market. Deliveries of steel scrap are well sustained, but only small quantities of cast and stove plate are appearing and dealers are unable to provide sufficient of these to meet melters' needs. Better tonnages of iron scrap are expected when snow disappears and rural stocks can be gathered.

Ferroalloys

Ferroalloy Prices, Page 122

Ferroalloy producers have reaffirmed prices for second quarter at the current level, except that on ferromanganese the extension is only to April 15. This is due to action by OPA, promising definite action early in April on requests for higher prices on that material. Producers are advising customers of this exception to the usual rule of announcement for an entire quarter.

Semifinished Steel

Semifinished Prices, Page 120

War Production Board's order to steelmakers to apportion semifinished steel to finishing mills in accordance with relative proportions of priority tonnage of finished material, to assure delivery of highest rated products at all times, will cause many problems to suppliers. Most mills have been following such a plan for some time, a natural development of the effort to supply most-needed material first.

Just what effect this will have on non-integrated mills remains to be seen. One result will be to reduce production of such forms of steel as do not carry the highest priority and supply tonnage to those must in demand. This condition has been developing for some time and application of the new order will simply accentuate it.

Iron Ore

Iron Ore Prices, Page 123

Preparation of Great Lakes ore carriers for an early start is being carried forward as rapidly as possible, in view of the unprecedented demand for ore this season. Secretary Ickes of the Department of the Interior believes after a survey of the situation that ships may move from lower lake ports as early as March 26, following ice conditions northward as closely as possible. Coal cargoes also will be started early, to increase fuel stocks at northern ports.

Washington is seeking an arrangement with insurance companies to modify pre-season insurance charges as an aid to an early start. Ice in the upper lakes is not as heavy as usual and ice breakers at the Soo are expected to open the rivers and Whitefish Bay earlier than normal.

Wire for Marine Corps

At 3.57c delivered, Wheeling Corrugating Co., Wheeling, W. Va., is low on 1,200,000 pounds of painted barbed wire for the marine corps, Arlington, Va., and Bethlehem Steel Co., 2,960,000 square feet of netting wire at 4.885c per pound.

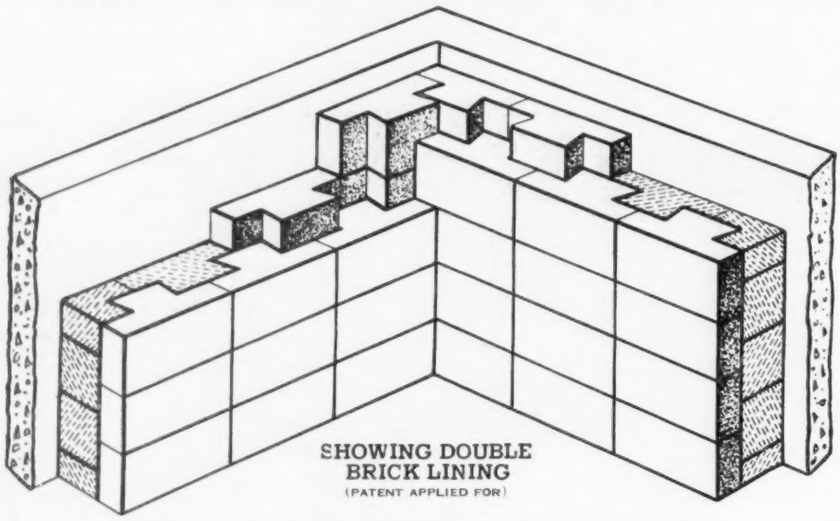
Steel in Europe

Foreign Steel Prices, Page 123

London — (*By Cable*) — Reduced steel imports into Great Britain are compensated for by expanding domestic output and satisfactory stocks. Second quarter booking has been actively started. Active demand continues for heavy plates, light shapes, wire rods and alloy steel. Demand for heavy structurals is improving. Use of tin plate

KEAGLER NUKEM

MONOLITHIC ACID PROOF CONSTRUCTION



Here is a new brick shape, manufactured of fire clay by the deairating method, and highly resistant to acid when used with Basolit Acid Proof Cement. It guarantees maximum strength of acid proof wall and is particularly adapted for high temperature pickling tank construction. The bricks are so shaped that walls may be made 5" or 8" without using additional shape brick. The type shown above is especially adapted as a sheathing for steel rubber-lined tanks, concrete shell tanks, acid pits or wooden tanks. Samples and catalogues sent on request.

THE KEAGLER BRICK COMPANY

MANUFACTURERS OF TORONTO ACID BRICK

•

STEUBENVILLE, OHIO

is being gradually changed to terne plate for oil and lacquered sheets for food containers. Exports are small.

Metallurgical Coke

Coke Prices, Page 121

Beehive coke production in February showed an increase, 21,800 net tons per day, compared with 20,874 tons in January. The January rate was the lowest since May, 1941, directly attributable to coal shortage. February total was down, due to the shorter month.

In February 8657 beehive ovens were in operation, compared with 8542 in January. Curtailment is threatened unless supply of cooking coal can be increased. About 45 per cent of coal supply is moved by truck, some mines being 20 miles from ovens.

Shortage of miners is appearing, the draft having taken many and opening of lake navigation is expected to draw a number of men from mines. Employment now is at about 28,000 men. Some mines now are operating only three or four days a week.

Higher costs are beginning to affect production by smaller operators. Price ceilings and the new freight rates on coal are having an adverse effect.

Equipment

Seattle—Federal agencies have practically monopolized the market, private buyers being handicapped by priorities and scarcity of equipment. J. R. Ummel, Seattle, has called bids March 17 for 43 pieces of road equipment for Alaska Road Commission, including 21 tractors, six patrol graders, three portable compressors, two gas hoists, four scrapers, three ½-yard shovels, three graders, two portable crushing and screening plants. Clallam county, Washington, will open bids March 20 for a power loader. Bids are in to the navy yard for 12 controllers, 12 pumps, electric hoist, etc. Bonneville Power Administration has awarded a $47,328 contract to Allis-Chalmers Mfg. Co. for furnishing metal clad switchgear; $11,024 for insulated wire, and $18,249 for copper cable to J. A. Roebling Sons Co., and $18,585 for copper cable to Nehring Electric Works, De Kalb, Ill. Bids are in to Bonneville for 27 distribution transformers, two identical at $11,547; for transformers for Vernita substation and 3500 pounds of chain.

Nonferrous Metals

New York—Rapid expansion of military requirements is forcing WPB to restrict further the use of metals for non-essential work. Regulations on the distribution of metals will be tightened and new restrictions likely will be issued. At the same time OPA will keep under constant review price schedules for their effect on production and distribution. Quotas on which premium prices for lead, zinc and coppers will be based have been about completed. McColgin ore sales agency has been commissioned as the agent for lead and zinc ore in the Tri-State district.

National Lead Co. has been selected to handle actual details of purchasing surplus white metal supplies while Federated Metals division of American Smelting & Refining Co. will act as the MRC agent in the purchase of surplus aluminum supplies.

WPB is expected to set up an "end use" code to guide fabricators of all metals in accepting or rejecting orders.

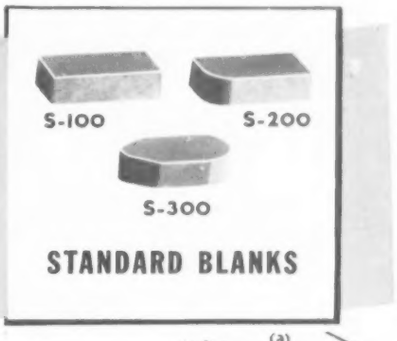
Copper—Refiners were able to ship only 75,766 tons of domestic and 21,850 tons of foreign copper to consumers in February. Stocks of domestic refined metal at the end of February totaled 77,329 tons, a drop of 4042 tons, while blister stocks dropped 1421 tons, making the drop in combined stocks of copper 5463 tons.

Lead—Further conservation measures are pending as supplies tighten.

Tin—Curtailment of consumption coupled with arrivals has made possible the maintenance of a high supply level. Supplies for essential uses appear assured for many months.

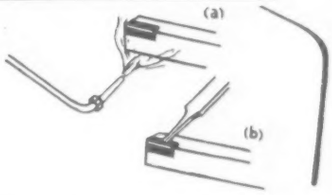
Zinc—WPB forsees the need for

Save TIME BETWEEN ORDERING AND "TOOL UP"



By making your own KENNAMETAL TOOLS

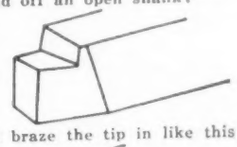
• KENNAMETAL tool blanks are shipped in 2 to 5 days after receipt of your order. That means you can have the advantage of KENNAMETAL quickly if you order these blanks and braze your own tools.



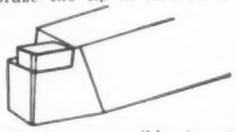
Two steps in brazing KENNAMETAL Tools. (a) Heating shank with torch. (b) Pressing tip into place with file.

It's easy to make KENNAMETAL TOOLS in your shop

It isn't always necessary even to mill a pocket for the KENNAMETAL tip. Contrary to popular impression the side wall on the reverse of a tipped tool is unnecessary, and eliminating it avoids brazing strain caused by warping. In such cases simply shape or grind off an open shank:



and braze the tip in like this:



NOTE: It is possible to save time and steel as well by re-tipping your old tools. Just saw off the shanks and braze on new KENNAMETAL TIPS.

If You Follow Simple Instructions in our Vest Pocket Manual

• You need only standard tool room equipment, plus a torch or a brazing furnace, to make your own KENNAMETAL steel cutting carbide tools. First step is to mill a pocket in the steel shank or simply shape or grind a step as shown at left. Then, using Tobin bronze or Ezy Flo, braze in the KENNAMETAL tip, and after it has "set", grind the clearance angles. Complete, easy to follow instructions are included in KENNAMETAL Catalog 42, or write for our new vest pocket manual for KENNAMETAL users.

SALES REPRESENTATIVES FROM COAST TO COAST

McKENNA METALS Co.
200 LLOYD AVE., LATROBE, PENNA.
Foreign Sales: U. S. STEEL EXPORT CO., 30 Church St., New York
(Exclusive of Canada and Great Britain)

KENNAMETAL
The Accepted
STEEL CUTTING
CARBIDE

Nonferrous Metal Prices

Mar.	Copper: Electro, del. Conn.	Copper: Lake, del. Midwest	Copper: Casting, refinery	Straits Tin, New York Spot	Straits Tin, New York Futures	Lead N. Y.	Lead East St. L.	Zinc St. L.	Aluminum 99%	Antimony Amer. Spot, N.Y.	Nickel Cathodes
2-13	12.00	12.12½	11.75	52.00	52.00	6.50	6.35	8.25	15.00	14.00	35.00

F.o.b. mill base, cents per lb. except as specified. Copper brass products based on 12.00c Conn. copper

Sheets

Yellow brass (high)	19.48
Copper, hot rolled	20.87
Lead, cut to jobbers	9.75
Zinc, 100 lb. base	13.15

Tubes

High yellow brass	22.23
Seamless copper	21.37

Rods

High yellow brass	15.01
Copper, hot rolled	17.37

Anodes

Copper, untrimmed	18.12

Wire

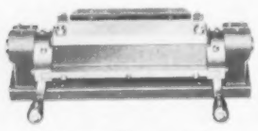
Yellow brass (high)	19.73

FORMING *without* DIES!

DI-ACRO "DIE ACCURACY WITHOUT DIES" PRECISION MACHINES

DI-ACRO SHEAR NO. 1

Trims duplicated stampings, shears stock sheets, cuts strips, squares up stampings, makes slits or notches. Shearing width 6".



DI-ACRO BRAKE NO. 2

Creates non-stock sized angles, channels, Vees, etc. Folding width 12". Right or left-hand operation. DI-ACRO BRAKE NO. 1, smaller size, shearing width 6".

● You can form or duplicate many metal parts to die accuracy and save time and die costs with "DI-ACRO" Precision Machines—Bender, Shear, Brake. As well as being used for short runs, experimental and research work, in many cases DI-ACRO Machines are proving profitable for production line work in multiple units. All duplicated work is accurate to .001".

Get NEW Catalog "METAL DUPLICATING WITHOUT DIES"

It describes the DI-ACRO System of "Metal Duplicating Without Dies" and shows many cost-cutting, time-saving applications in making small parts or pieces. Send for it today.

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DI-ACRO BENDER NO. 1

Forms intricate shapes from Angles—Channels—Rod—Round or Square Tube — Round, Half-Round Square or Flat Wire—Strip stock. TWO-WAY operation.

THE STARTING POINT *of*

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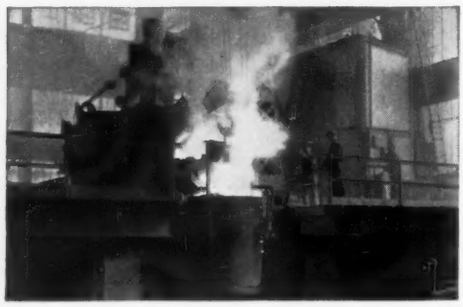
FORGINGS

CARBON-ALLOY AND SPECIAL BASIC ELECTRIC STEELS



COMPLETE control of all processing from selection of the melting charge to the finished condition is the N. F. & O. *guarantee of quality* in forgings furnished to your specifications — Smooth Forged, Hollow Bored, Rough or Finish Machined, Die Blocks and Piston Rods

NATIONAL FORGE AND ORDNANCE CO.

IRVINE, WARREN COUNTY, PENNA., U. S. A.

OLD METALS

Dealers' Buying Prices

No. 1 Composition Red Brass

New York	9.50
Cleveland	9.25-9.50
Chicago	9.50
St. Louis	9.50

Heavy Copper and Wire

New York, No. 1	10.00
Cleveland, No. 1	10.00
Chicago, No. 1	10.00
St. Louis	10.00

Composition Brass Turnings

New York	9.25

Light Copper

New York	8.00
Cleveland	8.00
Chicago	8.00
St. Louis	8.00

Light Brass

Cleveland	6.25-6.50
Chicago	6.50
St. Louis	6.50

Lead

New York	5.25-5.50
Cleveland	5.40-5.50
Chicago	5.25-5.60
St. Louis	5.25-5.35

Old Zinc

New York	5.00-5.25
Cleveland	5.25-5.50
St. Louis	4.50-5.00

Aluminum

Old castings	10.50
Segregated borings	8.50
Old sheet	10.50
Clips, pure	9.50

SECONDARY METALS

Brass ingot, 85-5-5-5, l.c.l	13.25
Standard No. 12 aluminum	14.50

allocating all zinc in the near future, instead of 50 per cent of high grade and 40 per cent of all other grades as in March. Primary slab zinc price schedule No. 81 was revised in respect to toll agreements and specifications.

DIED:

John Edward Daily, associated with the steel industry 37 years, recently as manager in the Chicago district for Youngstown Sheet & Tube Co., March 8, in that city. A member of the American Iron and Steel Institute, at one time he was identified with Wheeling Steel Corp., Timken Steel & Tube Co., and others.

•

Theodore A. Straub, 73, former president, Fort Pitt Bridge Works, Pittsburgh, March 9, in that city. He resigned from the presidency in 1938 after serving in that capacity for 40 years.

•

H. L. Harrison, for more than 12 years chief representative in Ohio and adjacent territories for Darwin & Milner Inc., Cleveland, March 3, at his home in Lakewood, O.

Stresses Contribution of Gas to War Production

Part that gas is playing in the production of war materials was outlined at the Industrial and Commercial Gas Conference of the American Gas Association at the William Penn hotel, Pittsburgh, March 12-13, by H. M. Heyn, manager, heat treating division, Surface Combustion Division, General Properties Co. Inc., Toledo, O.

Direct-flame annealing has made possible wire with such qualities that it has become the nerve center of airplanes which fly and fight at 25,000 feet.

The gas furnace that is producing 82 miles of .50-caliber machine gun bullet clips a day was never conceived with that idea in mind.

During World War 1, cost of a 155-millimeter shell was about $45; today the same-size shell of better quality is being made for less than one-half of the 1918 cost.

Mr. Heyn pointed out that one of the most fundamental elements used in high-speed cutting tools was tungsten. When disturbances in other parts of the world prevented industries from obtaining the amounts of tungsten needed, engineers were faced with two alternatives. Either slow down production by the return to common high-carbon types of steels for tools, or develop something new. The latter was done.

Molybdenum long has been known as a satisfactory substitute for high-speed tool steels with the supply adequate, he stated. However, the main disadvantage against its use was its susceptibility to decarburization during heat treatment. The development of the close atmosphere furnace made it possible to substitute molybdenum for tungsten and thus save high-speed tool production.

How Salesmen May Fit Into War Picture

NEW YORK

Progress in fitting sales forces into the war program was indicated at a meeting of the American Management Association here last week.

Tomlinson Fort, assistant manager of central station sales, Westinghouse Electric & Mfg. Co., Pittsburgh, said that by educating its salesmen to seek subcontracts, the company has placed work with more than 500 plants in 24 states for war equipment which it could not manufacture fast enough alone. He stated that $300,000,000 of defense work was booked before America entered the war.

Frederick B. Heitkamp, vice president in charge of sales, American Type Founders Inc., Brooklyn, said that output of peacetime products had dropped to 20 per cent, and that the sales force is being used in relations with subcontractors and in some aspects of production.

At another recent meeting, Col. Joseph F. Battley, chief of the Manpower and Liaison division in the Under Secretary of War's office, declared it was inevitable that many of the country's 2,000,000 salesmen will have to look for work essential to the war effort.

February Plate Shipments Establish New Record

Steel plate shipments in February set a new record with 758,723 tons, compared with 754,522 tons in January, C. E. Adams, chief, WPB Iron and Steel Branch, announces.

March total is expected to exceed 900,000 tons.

Plates shipped for merchant ship program were 15 per cent greater in February. Strip mills rolled 268,988 tons, 18 per cent over January.

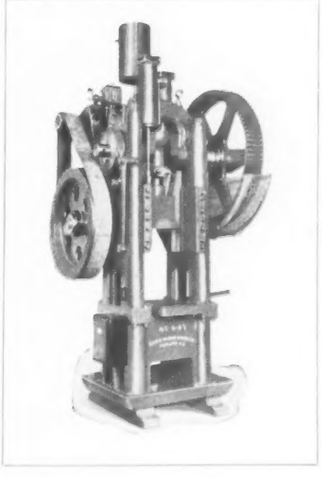
OHIO KNIVES TODAY— IT'S PRODUCTION.

Avoid stops and get going with long life Ohio Knives. Special alloy steels and the best workmanship assure you of fewer delays and less trouble.

O.K. Circular Shear and Slitters *O.K. Shear Blades*

O.K. The OHIO KNIFE Co. CINCINNATI OHIO - U.S.A.

MECHANICAL POWER PRESSES



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Horn
Reclinable
Straight Side
Roll and Dial Feeds
Double Action
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Punching
Toggle

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Our Specialty:

Patent Percussion Power Presses

ZEH & HAHNEMANN CO.
56 Avenue A. Newark, N. J.

Heavier Payrolls Factor Limiting Coal Output

Heavier pay envelopes in the coal mines are causing unusual difficulties for mine operators and apparently are preventing increased production. Some of the miners now earn from $20 to $25 a day and $10 to $12 a day is common. Because it is impossible for them to buy automobiles, refrigerators and similar items, and because work has been steady long enough for old bills to have been paid, many miners have an inclination to take things easy.

It is not unusual for a mine to lose two shifts after pay day. Some of the men will work for several weeks and then lay off until their earnings have been spent.

Other factors also contribute to limiting coal production. One of these is the drafting of miners into the army. Skilled miners now are virtually irreplaceable. Strict regulations by the union, as well as legislation, require that a man be trained for a considerable period before he can actually mine coal.

Another limitation is the union's insistence on a 35-hour week, despite emergency conditions.

Higher farm prices also are a factor. Some of the miners, especially in the Ohio, Kentucky and Illinois fields, have farms and the higher prices for their products makes it unnecessary for them to spend time in the mines.

United Engineering Sales Establish New Record

United Engineering & Foundry Co., Pittsburgh, reports 1941 net income of $3,309,297, equal to $3.96 a common share, compared with 1940 net of $3,724,460, equal to $4.47 on the common. Taxes took 59 per cent of total earnings.

Company's sales volume in 1941 established a new record. With the highest backlog in history and capacity booked solid into 1943 on a 7-day week schedule, substantial sums have been expended in construction of additional buildings, all of which will be written off during the emergency, the report states.

Dismantle Mill for Scrap

The Wilkes rolling mill, Sharon, Pa., idle since 1923, is being salvaged for scrap iron and steel. Equipment has been sold to the Youngstown Sheet & Tube Co. The plant started in 1887 as a wrought iron puddling mill and was turned into a rolling mill in 1907.

Steel Corp. Shipments Set New February Mark

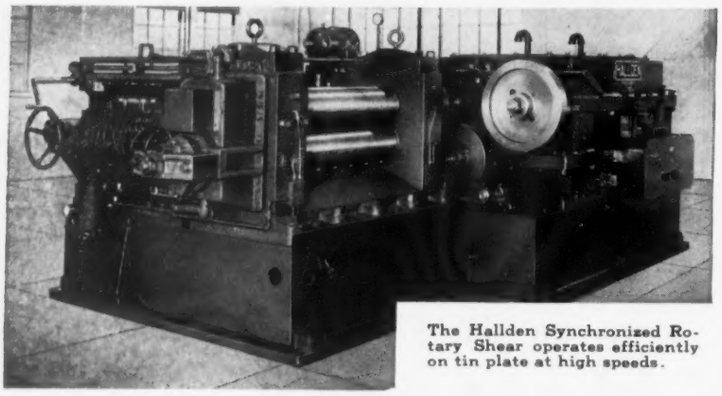
Shipments of finished steel products by the United States Steel Corp. in February, 1,616,587 net tons, were the highest for the month in the history of the corporation. Owing to fewer days, however, they were 122,306 tons, or 7 per cent, less than in January. They represented an increase of 68,136 tons over 1,548,451 tons shipped in February, 1941.

(Inter-company shipments not included)

Net Tons

	1942	1941	1940	1939
Jan.	1,738,893	1,682,454	1,145,592	870,866
Feb.	1,616,587	1,548,451	1,009,256	747,427
2 mos.	3,355,480	3,230,905	2,154,848	1,618,293
Mar.	.....	1,720,366	931,905	845,108
Apr.	.....	1,687,674	907,904	771,752
May	.....	1,745,295	1,084,057	795,689
June	.....	1,668,637	1,209,684	807,562
July	.....	1,666,667	1,296,887	745,364
Aug.	.....	1,753,665	1,455,604	885,636
Sept.	.....	1,664,227	1,392,838	1,086,683
Oct.	.....	1,851,279	1,572,408	1,345,855
Nov.	.....	1,624,186	1,425,352	1,406,205
Dec.	.....	1,846,036	1,544,623	1,443,969
Total, by Mos.	.....	20,458,937	14,976,110	11,752,116
Adjustment	.....	.....	†37,639	*44,865
Total	.....	.....	15,013,749	11,707,251

†Increase. *Decrease.



The Hallden Synchronized Rotary Shear operates efficiently on tin plate at high speeds.

SHEAR SPECIALISTS

The Hallden Machine Company manufactures shears exclusively for any application in steel and nonferrous metals.

THE HALLDEN MACHINE CO. THOMASTON CONN.

Associated Companies: The Wean Engineering Company, Inc.—Warren, Ohio
W. H. A. Robertson & Company, Ltd.—Bedford, England

THERE ARE DRILLS AND DRILLS

Drills on the camp-ground or drills on steel

Both go on with relentless zeal;

All with the same great end in view

And Levinson Steel with its part to do!

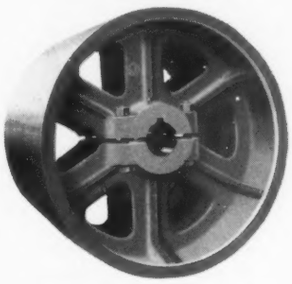
The LEVINSON STEEL Company

Fabricators of Structural and Miscellaneous Steel

33 PRIDE STREET · PITTSBURGH, PA.

High test cast iron pulleys in all sizes and types

Completely split pulley

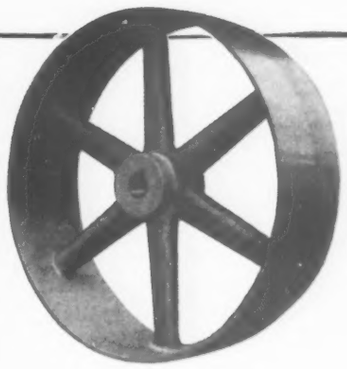


Extra heavy conveyor pulley

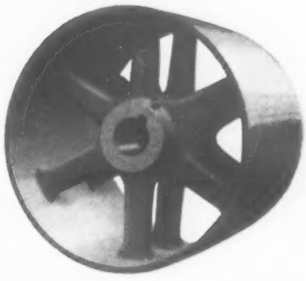
JONES cast iron pulleys are true running — they permit higher speeds — no bushings and they can't fall apart — they don't rattle and they look better on most machines.

These pulleys are machine molded, poured of high test cast iron, and are accurately finished and balanced. Multiple piece pulleys, rubber covered pulleys and flywheels can be furnished.

W. A. JONES FOUNDRY & MACHINE CO.
4437 Roosevelt Road, Chicago, Illinois



Single arm solid pulley



Double arm pulley

Jones

HERRINGBONE — WORM — SPUR — GEAR SPEED REDUCERS • PULLEYS
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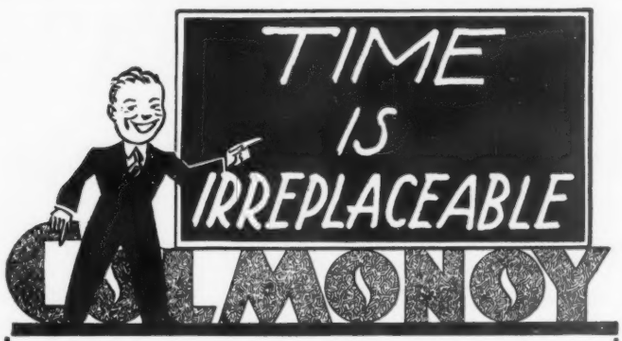
PILLOW BLOCKS • FRICTION CLUTCHES • TRANSMISSION APPLIANCES



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It consists of applying a casting of COLMONOY to steel base parts subject to corrosion, abrasion, wear and galling. Some of the advantages of this process are:

1. It is adaptable to high production parts.
2. There is complete freedom from porosity and cracks.
3. Parts can be hard-faced which are inaccessible for acetylene torch application.
4. Finishing requires the removal of considerably less material.

WRITE TODAY—Ask for full information on the COLMONOY Furnace Weld Process, as well as all the grades of COLMONOY for every hard surfacing requirement.

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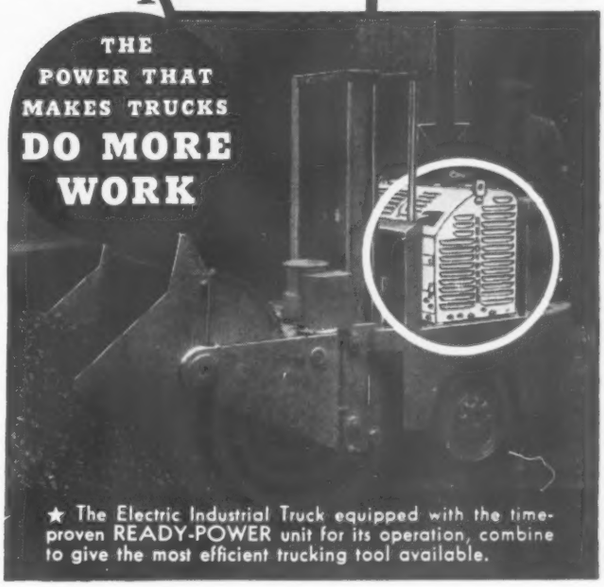
COLMONOY
Hard Surfacing Alloys and Overlay Metals

NO LET-DOWN IN POWER *with* READY-POWER

THE POWER THAT MAKES TRUCKS **DO MORE WORK**



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★ With READY-POWER (a gasoline-electric power plant for electric truck operation) truck speed is maintained and maximum tonnage is handled every hour throughout the day. Write for descriptive literature.

THE READY-POWER CO.
3842 GRAND RIVER AVENUE, DETROIT, MICHIGAN

Construction and Enterprise

Ohio

AKRON, O.—Goodyear Tire & Rubber Co., H. A. Flannery, manager of engineering, 1144 East Market street, will establish additional research facilities in $500,000 building which has been started at 140 Goodyear boulevard.

AKRON, O.—Firestone Tire & Rubber Co., 1278 South Main street, is having plans prepared for 50,000-square foot building and has started erection of 48,000-square foot plant. Each project will cost about $200,000 for the structure alone.

CANTON, O.—Diebold Safe & Lock Co. is renovating the plant recently acquired from Dayton Malleable Iron Co. and will install new equipment.

CANTON, O.—Hercules Motors Corp., 101 Eleventh street, will further expand engine plant with 100,000-square foot building.

CINCINNATI — Sawbrook Steel Castings Co. will build an addition to its plant providing 30,000 square feet of floor space.

CLEVELAND — Cleveland Graphite Bronze Co., 16800 St. Clair avenue, James L. Myers, secretary and treasurer, has preliminary plans for 20,000-square foot refinery building in connection with new plant.

CLEVELAND—Cleveland Chain & Mfg. Co., Broadway and Henry road, Garfield Heights, is considering boiler house to be built at present plant. Thornton E. Round is vice president and treasurer.

CLEVELAND—Crucible Steel Castings Co., Homer Tielka, West Eighty-fourth street and Almira avenue, will add 9000 square feet to production space. Estimated cost $30,000.

CLEVELAND—National Tool Co. is starting three-story addition at factory at 11200 Madison avenue. L. A. Schmidt is vice president and chief engineer.

CLEVELAND — National Acme Co., Fred H. Chapin, president, 170 East 131st street, is starting $400,000 factory building at 12819 Coit road, containing 85,880 square feet of floor space. Cleveland Construction Co., 3866 Carnegie avenue, contractor.

KENT, O.—Gougler Machine Co., 789 Stone, is starting its fifth expansion in the past two years.

MANSFIELD, O.—Westinghouse Electric & Mfg. Co., East Fourth street, C. L. Van Berau, plant manager, is remodeling an existing factory building at a cost of $50,000.

NEW PHILADELPHIA, O. — La-Del Conveyor & Mfg. Co., Ivor Harris, president, has begun a $150,000 expansion program. Contract for building, 60 x 260 feet, containing 20,000 square feet of floor space, has been let to Wendling Bros. Construction Co., Dover, O.

PAINESVILLE, O. — Sivon Machine Shop & Mfg. Co., C. A. Sivon, manager, 162 Maiden, has plans for 5000-square foot machine shop to be built on Richmond street.

Connecticut

STAMFORD, CONN.—V. Mayper, engineer, 110 West Fortieth street, New York, has asked bids for addition to Union Wire Die Corp.'s plant. Estimated cost $50,000.

New York

BROOKLYN, N. Y.—Vulcan Proofing Co., First avenue and Fifty-eighth street, has plans by William Higginson & Son, 101 Park avenue, New York, for altering two-story factory. Estimated cost $250,000.

ELMHURST, N. Y.—Kollsman Instrument Division, Square D Co., Forty-fifth avenue, will erect five-story factory, costing $397,000. S. Napp, 103 Park avenue, New York, engineer.

Pennsylvania

PITTSBURGH—Blaw-Knox Co., Union Steel Castings Division, Farmers Bank building, has plans for a manufacturing building in Pennsylvania. Hunting, Davis & Dunnells, Century building, Pittsburgh, architects.

SHARON, PA. — National Malleable Steel Castings Co., Sharon, has awarded contract to H. T. Osborne, Miller Park, Franklin, Pa., for an addition to factory building somewhere in Pennsylvania.

TARENTUM, PA. — Borough, H. H. Girt, secretary, 304 Lock street, is taking bids for contract No. 3 for alterations and addition to light and power plants. Approximate cost $90,000. Morris Knowles Co., Park building, Pittsburgh, architect.

Michigan

DETROIT—Charles N. Agree, Detroit architect, is taking figures for an addition to the factory of Willey's Carbide

Lee Conveyor SCREWS
are helically coiled bands of metal pitched to requirements, for welding to a shaft. Light in weight; great in strength, toughness and adaptability, they make a preferred method of constructing helical conveyor screws. Promptly available in low carbon steel for all ordinary applications or in 16-18% chrome steel for resistance to corrosion and abrasion. Other metals also available. You are invited to look into the possibilities of this preferred conveyor screw.
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Lee SPRING CO., INC.
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Superior steel corporation

HOT & COLD ROLLED STRIP STEEL AND SUPERIOR STAINLESS STEELS

IN ALL GRADES AND ANALYSES

Successfully Serving Steel Consumers for almost Half a Century

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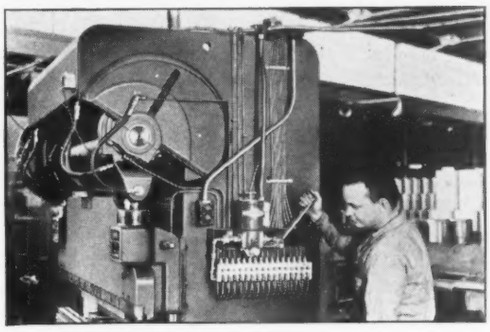
Cut down bearing failures and prevent delays in producing war orders

LINCOLN CENTRO-MATIC LUBRICATING SYSTEMS

are Easy to Install

on new or old machines



Lubricate all bearings from a central source

The Lincoln Centro-Matic System consists of a number of Centro-Matic Injectors—one for each bearing—and a suitable Centro-Matic lubricant pump. The injectors may be grouped in one location or located separately at each bearing. In either arrangement only a single lubricant supply line is required. The lubricant pump may be hand or power operated—Power operated systems may be semi-automatic or full-automatic . . . Write for bulletin 888.

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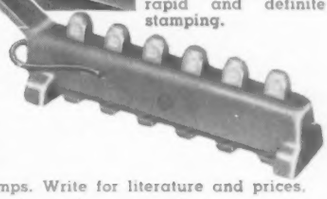
PIONEER BUILDERS OF LUBRICATING EQUIPMENT
ST. LOUIS, MO.

Steel Mill PLATE STAMPING

Slab section and sheared plate identification is rapidly stamped with Matthews Plate Stamping Holders. Of tool steel construction, they are light in weight and very durable. Easy to handle! The "Shepherd-Hook" holding device eliminates "wrong - side - up" stamps. Stamps cannot fall out or fly out on rebound from hammer blows. Safe, rapid and definite stamping.



Steel stamps are held in place by a properly tempered "Shepherd-Hook." They are quickly and easily changed. Holders are made for any required quantity of stamps. Write for literature and prices. State character size and number of characters to be stamped.

Same holder made for marking pipe, rounds, etc.

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JETAL saves you 30% in price . . and goes farther.

JETAL, as a base for lacquers, enamels and japan shows superior salt spray resistance, improved bonding and prevents spreading of corrosion under the film.

Immediate delivery—any quantity.

Send samples for JETALizing without charge. Consultation service without obligation.

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Tool Co., Detroit.

DETROIT—Preliminary plans are being prepared by Hugh R. O'Mara, engineer, for addition and alterations to factory of Murchey Machine & Tool Co., Detroit.

DETROIT—Atlas Engineering Co. will erect an addition to its factory on Strathmoor avenue. Paul R. Sewell is architect.

DETROIT—Bullard Gage Co., 17168 Redford road, has been organized with $25,000 capital to manufacture tools and dies. Correspondent: Ebert Bullard, 44440 Hull road, Belleville, Mich.

DETROIT—P. J. Grad Co. Inc., 2020 McKinstry avenue, has been incorporated with $10,000 capital to manufacture gages and tools, by Peter Joseph Grad, 3601 Twenty-third street.

GRAND RAPIDS, MICH.—Owen-Ames-Kimball Co., Grand Rapids, general contractor, is taking figures on sub-trades for construction of office and manufacturing buildings near Benton Harbor, Mich., for Auto Specialties Mfg. Co., St. Joseph, Mich.

MELVINDALE, MICH.—Giffels & Vallet Inc., Detroit, is preparing plans for forge and office building here for Timken-Detroit Axle Co.

SAGINAW, MICH. — Chevrolet Motor Division of General Motors Corp. will erect an aluminum forge plant here. Albert Kahn Associated Architects & Engineers Inc., Detroit.

SAGINAW, MICH. — Mitt & Merrill, Saginaw, have awarded contract to Arthur Vollmer, Saginaw, for addition to manufacturing building.

Illinois

CHICAGO—Allied Steel Castings Co., 147th street and Lincoln highway, will soon begin work on foundry addition, 100 x 300 feet. General contractor, Dietrich & Bullen, 228 North LaSalle street.

CHICAGO — Chicago Gear Mfg. Co., 2823 West Fulton street, is engaged in a $300,000 expansion program of buildings and equipment. This includes a two-runway storage structure, 50 x 150 feet, equipped with two five-ton electric cranes, and also a two-story building, containing office space, machine shop and engineering department.

CHICAGO—Miehle Printing Press & Mfg. Co., West Fourteenth street and South Damon avenue, has started a $2,300,000 expansion program, comprising a one-story plant addition and installation of machinery and equipment.

CHICAGO—Midland Pipe & Supply Co., 4646 West Roosevelt road, has acquired the former plant of Clapp, Riley & Hall Equipment Co., 2835 South Sixty-first court, Cicero, and has moved into the new quarters. Approximately $100,000 is being spent to modernize and equip the plant.

Indiana

AUBURN, IND.—Auburn Mfg. Co. is erecting a plant 200 x 360 feet, and will purchase new machinery and equipment.

COLUMBUS, IND.—R. J. Dickey Co. is rebuilding its plant at cost of $40,000, including equipment.

EVANSVILLE, IND.—United States engineer, P. O. Box 59, Louisville, Ky., will take bids March 19 for erection of five pumping plants here.

INDIANAPOLIS — International Machine Tool Co., 1124 West Twenty-first street, has let contract to Hetherington & Berner Inc., 701 Kentucky avenue, for one-story 100 x 100-foot factory. Cost $63,000. A. Gage, 701 Kentucky avenue, engineer.

Delaware

WILMINGTON, DEL. — War Department has awarded contract to E. I. du Pont de Nemours & Co., Wilmington, for design, engineering, construction and operation of manufacturing plant in Tennessee.

Maryland

BALTIMORE—Samuel M. Pistorio, 6400 Frederick road, will erect factory, 120 x 220 feet, costing about $17,000.

BALTIMORE—Bartlett Hayward Division, Koppers Co., 200 Scott street, has plans by J. R. Edmunds Jr., Calvert building, for factory. Estimated cost $250,000.

Mississippi

BEAUMONT, MISS.—Board of supervisors of Perry county will construct $118,800 water storage tank, well, pump and pump house, sewage system, and sewage treatment plant.

North Carolina

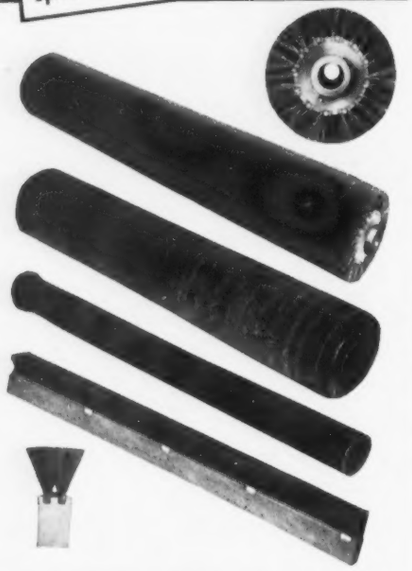
SWANSBORO, N. C.—City will construct $60,620 sewer lines, treatment plant, etc., and $66,000 water supply system, including a 100,000-gallon storage tank.

WILMINGTON, N. C.—North Carolina Shipbuilding Co. has purchased about 74 acres adjacent to present property and has started work on steel storage racks and fabrication shops.

South Carolina

GREENWOOD, S. C.—City, A. C. Nichols, city manager, has approval for

FULLERGRIPT BRUSHES
For your machine needs.
Made with metal backing;
spiraled or formed to specifications.



FULLERGRIPT BRUSHES for your Pickling, Galvanizing and Tinning Departments. Furnished in straight strips to be applied to your present wood blocks for the removal of middlings.

Also furnished in a continuous, complete (close or open) spiral formation for cylindrical scrubbers in steel or brass mills.

FULLERGRIPT BRUSHES have greater holding and non-shedding qualities, resulting in longer life and more dependable operation. Less frequent replacements will save you time and money. Send blueprints or specifications of your requirements.

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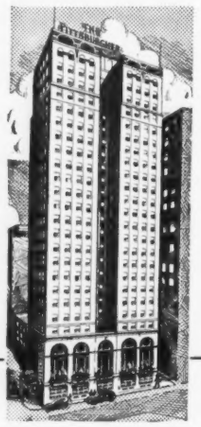

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400 rooms,
all with
outside view
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Radio in
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$3.30 to $4.40
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The HOTEL
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A KNOTT HOTEL
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SHEET METALS

ORNAMENTAL—INDUSTRIAL

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NEW YORK

$57,209 allotment for construction of two sewage disposal plants and pumping station; city to supply $125,817.

Tennessee

MANCHESTER, TENN. — Town will construct $107,000 sanitary sewer system, including sewage treatment plant; has loan of $50,000 and grant of $57,000.

NASHVILLE, TENN. — War Department has authorized construction of manufacturing plant in Tennessee to cost about $5,000,000, under supervision of Nashville district office.

Louisiana

NEW ORLEANS—Texas & Pacific and Missouri Pacific railroads have permit for erection of buildings on Front street, including engine house, machine shop and power plant. Total cost $100,500.

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Missouri

ST. LOUIS—Fruin-Colnon Contracting Co., 408 Olive street, has contract for addition to foundry for Medart Co., 3500 DeKalb street. Cost $10,000.

ST. LOUIS—St. Louis Steel Products Co., 2209-15 Chestnut street, recently sustained damage to its plant by fire.

VALLEY PARK, MO.—City has $93,150 grant for construction of sewers and sewage treatment plant; $30,000 bonds available. Caldwell Engineering Co., Jacksonville, Ill., engineer.

Arkansas

STAMPS, ARK. — Arkansas Power & Light Co., Pine Bluff, Ark., will construct electric generating plant near here. First unit, of 30,000-kw. capacity, will cost $3,000,000.

Texas

GALVESTON, TEX.—W. Horace Williams, 833 Howard avenue, New Orleans, has contract for machine shop addition to Todd Shipbuilding Corp.'s plant.

Nebraska

LINCOLN, NEBR.—Lincoln Industries Inc., R. B. Elrod, president, Chamber of Commerce building, will erect steel casting plant costing $650,000. G. R. Pierce, engineer, Chamber of Commerce building.

Nevada

LAS VEGAS, NEV.—A three-unit manganese mill and refining plant, to be erected in this area, has been recommended by government agencies and would be financed by Defense Plant Corp.

California

GLENDALE, CALIF. — Kinner Motors is erecting a factory, 160 x 340 feet, at 650 West Harvard street, to cost approximately $150,000.

HUNTINGTON PARK, CALIF.—White Heat Treating Co. is the firm name under which Clarence White has obtained a certificate to conduct business at 2005 Randolph street.

HUNTINGTON PARK, CALIF.—Building permit has been issued to Baker Oil Tool Inc., 2959 Slauson avenue, for addition to factory.

LOS ANGELES — Mono Molybdenum Co. has been incorporated with $100,000 capital. Joseph C. Cannon, Security building, Los Angeles, is California agent.

LOS ANGELES — Maritime Brass & Bronze Works has been incorporated with capital of $75,000, by A. N. and Grace M. Thomas, and J. A. and Sydelle Robinson, all of San Pedro. The new firm is represented by Arch E. Ekdale, 614 South Pacific avenue, San Pedro, Calif.

LOS ANGELES—United Tool & Mfg. Corp. has been formed with 5000 shares of no par value stock, by Nina Kennedy, Isabel Giffin and F. F. Heinig, of Los Angeles. Corporation is represented by Hunter & Liljestrom, 756 South Broadway.

LOS ANGELES—J. R. Tool & Mfg. Co. is the firm name under which Ralph Jordan has obtained certificate to conduct business at 2431 East Fifty-sixth street, Los Angeles.

Washington

SEATTLE — Olson Boiler & Welding Works will build machine shop and boiler works, 48 x 85 feet at 1761 Airport way.

SEATTLE—Ederer Engineering Co. is erecting steel fabricating shop, 54 x 160 feet at 2939 Utah street.

Canada

VANCOUVER, B. C.—Canadian Sumner Iron Works Ltd., 560 Vernon drive, is having plans prepared for addition to plant on Boundary road, to cost about $25,000, equipment extra.

ST. JOHN, N. B.—Saint John Machine Shop Ltd., 27 South Wharf, has had plans prepared and received government license for construction of plant to cost $75,000.

HAMILTON, ONT.—Toronto, Hamilton & Buffalo Railway Co., E. F. White, engineer, will proceed with reconstruction of main car repair shops on Aberdeen avenue, to replace plant destroyed by fire.

KINGSTON, ONT.—Kingston Shipbuilding Co., Ontario street, has received bids and will let contracts immediately for machine shop to cost about $65,000. Plans prepared by Hutchison & Wood, architects, 204 Notre Dame street West, Montreal, Que.

THOROLD, ONT.—Exolon Co. Ltd. has awarded number of contracts for plant addition to cost about $20,000. R. C. Wilcox is works manager.

TORONTO, ONT. — Research Enterprises Ltd., Atlas building, is having plans prepared by Allward & Gouinlock, architects, 57 Bloor street West, for further plant addition at Leaside to cost about $1,000,000.

TORONTO, ONT. — Dominion Tar & Chemical Co. Ltd., Morse street, is having plans prepared by own staff for plant to cost about $45,000.

TORONTO, ONT.—McQuay-Norris Mfg. Co. of Canada Ltd., Ray and Goddard avenues, Mount Dennis, has given general contract to Anglin-Norcross Ontario Ltd., 57 Bloor street West, for construction of plant addition, 40 x 140 feet, to cost $35,000.

TORONTO, ONT. — Dominion Bridge Co. Ltd., Sorauren avenue, has received bids and will award contracts immediately for construction of plant addition, to cost $85,000.

WELLAND, ONT.—Canada Foundries & Forgings Ltd., Empire street, has let general contract to Standard Steel Construction Co. Ltd., Port Robinson, for construction of heat treating plant, 30 x 70 feet, to cost about $15,000.

WINDSOR, ONT.—S-K-D-Tool Co., 1673 Moy avenue, has completed plans and received government license for construction of plant addition to cost $28,000.

JOLIETTE, QUE.—Joliette Steel Co. Ltd., Laval street, has completed plans and will start work soon on foundry addition, 50 x 100 feet, to cost about $40,000, including equipment.

MONTREAL, QUE.—Allied Brass Ltd., 159 Craig street West, is taking bids for one-story, 30 x 30-foot plant addition to cost $30,000. E. C. Warren, chief engineer.

MONTREAL, QUE. — Department of Munitions and Supply, Ottawa, has awarded general contract to A. Janin Building Co. Ltd., 1460 Sherbrooke street West, for ordnance buildings to cost $1,300,000.

THURSO, QUE.—Singer Mfg. Co., 700 St. Catharine street West, Montreal, has given general contract to A. F. Byers & Co. Ltd., 1226 University street, Montreal, for plant addition to cost about $80,000, with equipment.

WATERLOO, QUE. — International Flare Signal Co. Ltd., Warden road, will start work in the early spring on plant addition to cost about $30,000, equipment extra.

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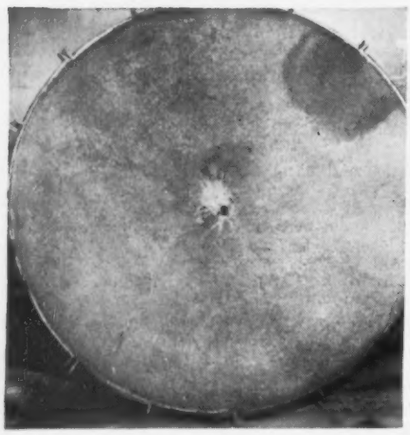
Proof of the Adaptability of Refractory Concrete

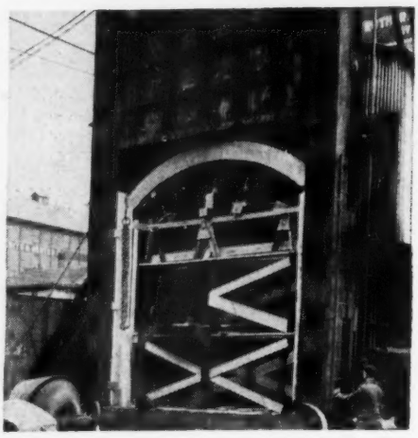
...made with Lumnite!



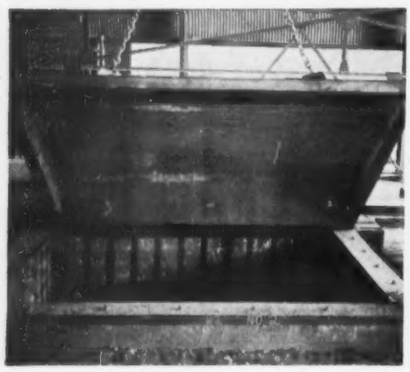
NO JOINTS HERE to leak heat! Because this circular annealing furnace cover (inside view) was lined with Refractory Concrete made with Lumnite... in order to give a smooth, monolithic surface.

THESE PICTURES show a few of the many ways in which Refractory Concrete can save you time and money. Refractory Concrete is a special type concrete, combining high cold strength with strength after long exposure to high furnace temperatures. It is made by mixing Lumnite—a heat-resistant binder—with refractory or insulating aggregates... to obtain just the thermal qualities you desire.

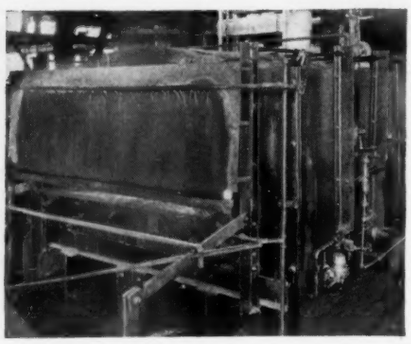
Are you interested in reducing your insulation costs? Do you have trouble with operating delays during refractory replacements? Is your furnace efficiency lowered by excessive heat loss through joints? If your answer to any of these questions is "yes," then you will want to know more about Refractory Concrete. You can get detailed information by sending for your copy of the booklet, "Refractory Concrete." Address The Atlas Lumnite Cement Co. (United States Steel Corp. Subsidiary), Dept. S, Chrysler Building, New York City.



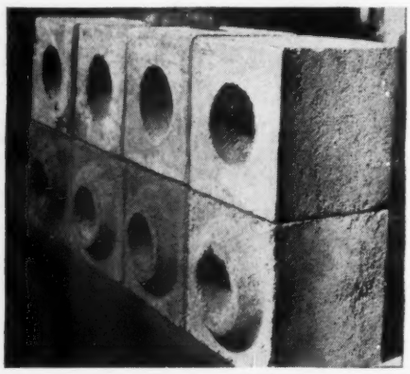
PRE-CAST REFRACTORY CONCRETE roof arch section was installed in this stress-relieving furnace three years before the picture was taken. Then side walls beneath the arch were rebuilt with Refractory Concrete.



LOW-COST INSULATION was obtained in this modern billet cooling pit by making the cover lining of one-piece, cast-in-place Refractory *Insulating* Concrete. Smooth walls and bottom—without masonry joints—are provided by Refractory Concrete. All are made with Lumnite. Monolithic construction makes it easy to build in the vertical guard rails seen in the picture.

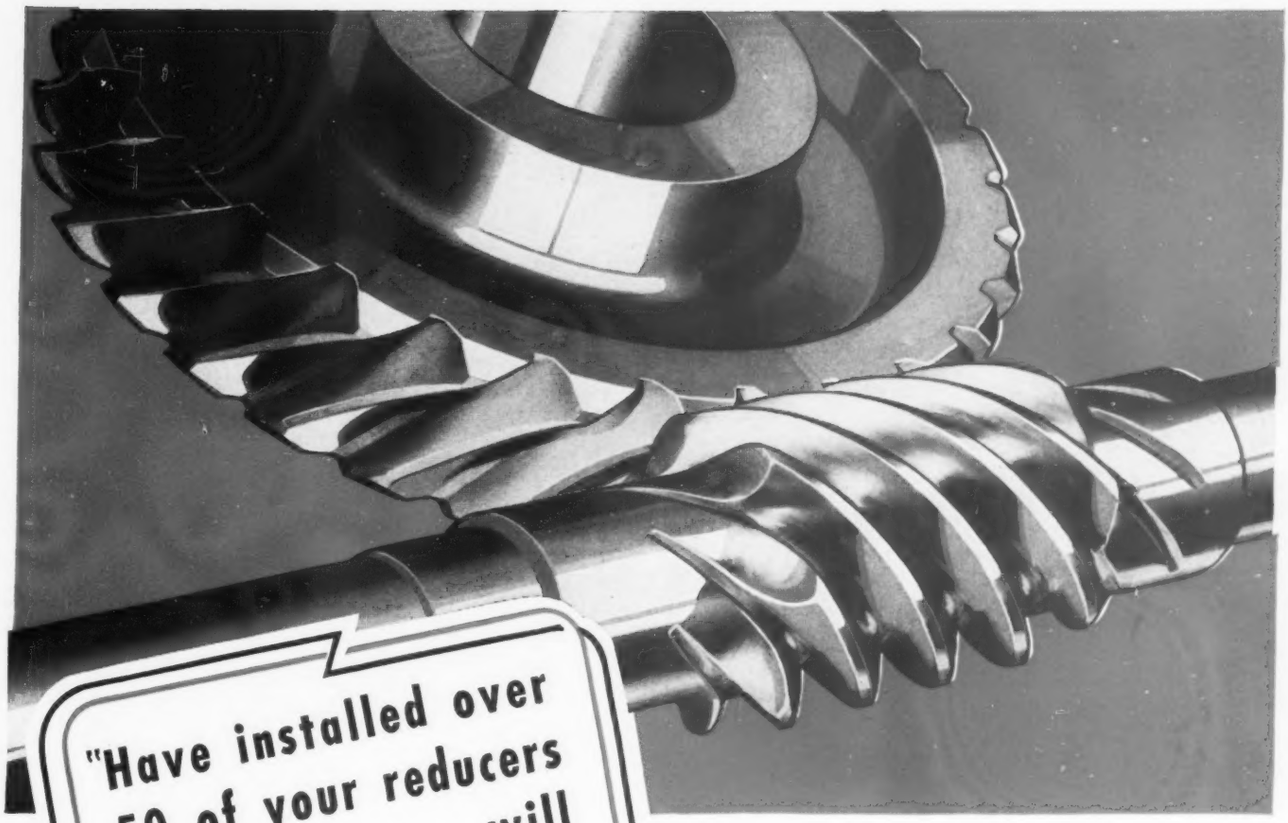


CAST-IN-PLACE, the bottom, walls and roof of this rivet-rod heating furnace are of Refractory Concrete made with Lumnite. Back-up, subfloor and roof cover of Insulating Concrete. Heat-resistant Concrete formed a level, monolithic bottom slab.



FACTORY-PREPARED MIXTURES of Lumnite and selected aggregates offer you a means of making Refractory Concrete simply with the addition of water. Lumnite castables are obtainable from refractory manufacturers and their distributors. These castables have the characteristic advantages of Refractory Concrete: quick-hardening, high cold strength, sustained strength in service.

LUMNITE FOR REFRACTORY CONCRETE



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THIS large Eastern Company first bought 6 Cleveland Units in 1922 and has increased its purchases since then to a total of more than 50. This evidence of satisfaction with Clevelands is confirmed in a letter from one of its Engineering Executives:—

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Install Clevelands on *your* new equipment and help insure trouble-free operation and maximum output—8 hours a day, or 24.

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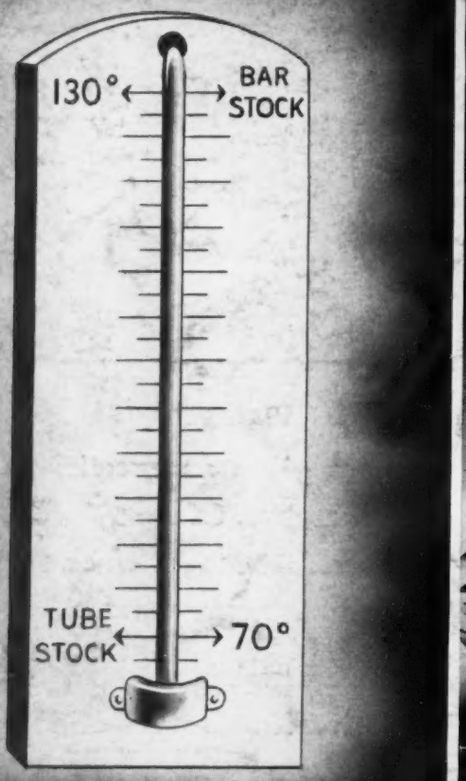
In Canada: PEACOCK BROTHERS LIMITED

CLEVELAND WORM GEAR *Speed Reducers*

A TIP TO MACHINISTS

Less Heat — Better Size and Finish



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It will be vital after victory, too. Accurate size and good finish are a part of quality.

You'll have less trouble with "excessive heat" on your automatic machines if you use tubing in place of bar stock in the fabrication of cylindrical parts.

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